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REPORT

ON AN

Additional Collection of Skeletal Remains,
from Arkansas and Louisiana

(Made, and presented to the National Museum, in 1909, by Mr. Clarence B. Moore)

BY

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In charge of the Division of Physical Anthropology, United States National Museum

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REPORT ON AN ADDITIONAL COLLECTION OF SKELETAL REMAINS, FROM
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I.

The material to which this report applies consists of 58 crania, and of numerous bones from the same as well as from other skeletons. In all there are ninety-one lots, thirty-seven of which are from Arkansas, and fifty-four from Louisiana. Those from Arkansas come from a single burial place, while the bones from Louisiana were gathered from seven different localities. Details concerning these places, the modes of burial, and the archaeology of the graves, are given in the preceding Memoir by Mr. Clarence B. Moore. The localities in which the skeletal remains were found are shown on the accompanying sketch map, which gives also those from which came the skeletal material described by the writer in Mr. Moore's last year's report¹ and to which frequent reference will be made in this paper.

The skulls and bones show various states of preservation, but for the greater part they are more or less imperfect. None of the specimens is mineralized, or much devoid of animal matter. All, with one exception, are plainly Indian; the exception, a skull of a female about fifty years of age, with moderate "flat-head" deformation, is negroid. This skull, in all probability, is that of a negro-Indian mixed-blood, and will not receive further consideration.

The majority of the crania, both from Arkansas and from Louisiana, exhibit artificial deformation. The deformation represents both of the two varieties, namely, occipital flattening or cradle-board compression,² and fronto-occipital flattening ("flat-head" deformation). The forms occur together in some of the localities, but owing to some insufficient method practised to produce the fronto-occipital flattening, they are not always clearly distinguishable. Each variety of deformation predominates in, but is not limited to, a certain type of people, indicating adoption of customs in this regard by some of the groups.

As to anthropological identifications, there is, notwithstanding the comparatively large number of specimens, little evidence on which conclusions can be based. The crania that had been artificially altered in form are to a large extent useless

¹ "Report on a Collection of Crania from Arkansas." Journ. Acad. Nat. Sci., Phila., 1908, XIII, pp. 558-563.

² See writer's article on "Artificial Head Deformation," Handbook of American Indians, Bull. 30, Bureau of Amer. Ethnol., Wash., 1907, Part 1, p. 96.

for this purpose. Fortunately there are also skulls that exhibit only slight deformation, and a small number of wholly normal ones. These indicate, for the region covered, two distinct types of Indians.

The predominating type is that of the brachycephals, known partly from the previous report. These people, it appears from the material last collected, ranged in stature from moderate to well-developed, with good though not pronounced muscular development. They were probably the people among whom prevailed, and who communicated to their neighbors, the intentional fronto-occipital deformation.

The other type, less well represented, indicates Indians of stature and strength similar to those of the people just mentioned, but with oblong, mesocephalic to dolichocephalic skulls. They were, in all probability, remnants of a relatively large local strain of dolichocephals mixed with the more numerous round-headed people. They exhibit the occipital, cradle-board head-flattening, but they practised also fronto-occipital compression. The physical characteristics of these people, so far as they can yet be isolated, approach, on one hand, those of the more northerly tribes of Missouri, Illinois, and parts of Tennessee and Kentucky, and, on the other, those of more westerly and southwesterly tribes, represented in northern Texas and especially by the oblong-headed type among the Pueblo Indians. The prevalent occipital flattening of the skull would point likewise to a connection with the southwest and the northeast. However, no great weight can be placed on this latter feature alone, for it represents a custom which could be communicated from one tribe to another, rather than a fixed, organic, hereditary condition.

In addition to the collections referred to, there were found, on examination of the older gatherings from Arkansas and Louisiana in the National Museum, a few crania which resemble very closely the sub-type of the eastern Algonquians.

Barring the element last mentioned, the tribal mixture under consideration, in all its more important characteristics, is closely related to the people of Arkansas and Jefferson counties, Arkansas, whose skeletal remains Mr. Moore uncovered during his investigations of the year before. The short-headed type is doubtless identical in both series.

Numerous long-bones and several of the skulls in Mr. Moore's collection of 1909 give manifest signs of a constitutional disease, seemingly syphilis. Other specimens from the collection, now partly in the National Museum and partly in the Army Medical Museum, show osteo-arthritis, marginal exostoses, and effects of fractures or dislocations; there are two tibiae with abnormal curvature, and four bones with lesions indicating localized suppurative processes. However, notwithstanding the specimens last mentioned, there appear no definite signs of rickets or of tuberculosis, and no instance occurs of bone tumor or of necrosis of bone.

On account of the varied character of the material, the detailed report which follows must necessarily deal with the specimens by localities only. It gives numerous results of measurements and observation, both interesting and important, which have not been touched upon in the preceding remarks and which show the value of Mr. Moore's most recent collection.

Nevertheless, the data, even when supplemented with those bearing on the older collections in the National Museum, from this part of the country, fall far short of covering the territory of the two States, and allow but little perspective in point of time. They afford, however, a substantial step toward the elucidation of the anthropology of Arkansas and Louisiana, and should stimulate further careful collection of the skeletal remains of the aboriginal inhabitants of these regions.

II.

ARKANSAS.

Mr. Moore's collection from Arkansas in 1909 was made at Boytt's Field, Union county, and comprises the list of specimens given below.

Sexual recognition offers, as usual, some difficulties, but owing to the presence in many cases of long- and other bones, it is possible to carry the identification to within a very small margin of possible error. In age estimates, the uncertain "approximate age in years," such as was employed in last year's report, is replaced by references to defined periods of life, determinations of which are safe and scarcely less serviceable.

SKULLS AND BONES FROM ARKANSAS.					
Locality	Specimen	Original No.	Museum No.	Sex	Period of Life*
Boytt's Field, Union Co.	Bones	A	255.133	Female	Adult
"	"	"	.133a	Male	"
"	Skull and bones	2	.123	"	Young adult
"	"	3	.125	"	Middle-age adult
"	Skull	4	.152	"	"
"	Skull and bones	5	.124	"	"
"	Skull	6	.144	Female	"
"	Bones	7	.132	Male	Adult
"	Skull and bones	8	.122	Female	Middle-age adult
"	"	10	.121	Male	"
"	Bones	10	.121a	"	Adult
"	Skull	11	.130	Female	Young adult
"	Skull and bones	12	.143	"	Middle-age adult
"	"	13	.127	Male	Near adult
"	Bones	14	.139	"	Adult
"	Skull and bones	17	.126	"	Young adult
"	"	18	.129	Female	Middle-age adult
"	"	19	.141	Male	Aged adult
"	Bones	20	.134	"	Adult
"	"	21	.138	"	"
"	"	21	.138a	"	"
"	Skull and bones	22	.120	Female	Middle-age adult
"	Bones	23	.131	Male	Adult
"	Skull	24	.145	"	Middle-age adult
"	Bones	28	.142	"	Adult
"	"	32	.140	"	"
"	"	33	.136	"	"
"	"	34	.135	"	"
"	Skull	36	.151	Female	Middle-age adult
"	Skull and bones	37	.119	Male (?)	Young adult
"	Bones	40	.137	Female	Adult
"	Skull	41	.147	"	Middle-age adult
"	"	43	.149	Male	"
"	Skull and bones	52	.128	"	Young adult
"	Skull	53	.146	Female	Middle-age adult
"	"	54	.150	Male	"
"	"	55	.148	Female	Aged adult

* "Young adult" = 23-40 years of age: basilar suture closed; eruption of permanent teeth finished; wear of teeth slight to moderate; no synostosis externally in the normal sutures of the cranial vault.

"Middle-age adult" = 40-55 years of age: teeth worn off moderately to medium; various, generally minor, grades of synostosis externally in the sutures of the vault.

"Aged adult" = exceeding 55 years of age: teeth worn off considerably; synostoses in sutures advanced or complete.

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As seen from the table, the specimens represent 24 male and 12 female full-grown individuals. The predominance of males may be accidental.

Of crania, 13 males and 10 females are represented. Among the male skulls, 3 are normal, 6 show slight to pronounced occipital and 4 slight to considerable fronto-occipital flattening; while among the females 3 also are normal, 2 show occipital flattening, and 5 fronto-occipital compression. Additional details regarding the deformations will be found in the first table of measurements.

Five of the crania and numerous bones show indications of syphilis, arthritis, or other pathological conditions; an itemized account of these forms is given in a succeeding chapter.

There are only a few anomalies of a more important nature, even if the teeth and dentition are included in the consideration. In male skull No. 255.119 the basilar process shows on the right side a pronounced lateral fissure to within 0.8 cm. of the median line. In male skull No. 225.124 the right nasal bone, triangular in shape, reaches only a little above the middle of that on the left, its absence

CRANIA FROM ARKANSAS—MEASUREMENTS RELATING TO FORM
MALES

Museum No.	Deformation	Diameter antero-posterior maximum	Diameter lateral maximum	Basion-bregma height	Cephalic index	Height-length index	Height-breadth index
		cm.	cm.	cm.			
255.119	.....	16.7	14.7	14.1	88.0	84.4	95.9
.126	.....	17.6	14.8	14.0	84.1	79.5	94.6
.149	.....	17.3	14.3	13.5	82.7	78.0	94.4
.121	Considerable occipital compression	(15.7)	(15.2)	(13.7)	?	.....	.....
.123	Moderate occ. comp.	(16.9)	(14.6)	?	(Probably mesocephal)	.....	.....
.124	Medium fronto-occ. comp.	(16.4)	(15.7)	(14.3)	?	.....	.....
.125	Slight occ. comp.	(17.3)	(14.2)	(13.8)	Meso- or low brachycephal)	.....	.....
.127	Traces of frontal with considerable occ. comp.	(15.9)	(15.4)	(14.6)	?	.....	.....
.128	Medium fronto-occ. comp.	(16.2)	(15.9)	?	?	.....	.....
.141	Moderate occ. comp.	(17.6)	(15.1)	(14.8)	(Nearly brachycephal)	.....	.....
.145	Pronounced occ. comp.	(17.3)	(15.7)	?	Probably mesocephal)	.....	.....
.150	Moderate lateral occ. comp.	(17.7)	(14.8)	(14.3)	Meso- or low brachycephal	.....	.....
.152	Pronounced fronto-occ. comp.	(16.9)	(16.1)	(14.5)	?	.....	.....

farther up being compensated partly by the left nasal and partly by the nasal process of the right superior maxilla. In male skull No. 225.141 the glenoid fossæ, especially the right, are unusually narrow antero-posteriorly.

Dental and numerous other minor anomalies will be referred to later.

In their anthropological characteristics the bones from Boytt's Field do not show differences, either in proportions or in form, clearly enough to enable separation into more than one type. Yet the skulls are not homogeneous. All the normal crania, and a number of those the shape of which has been artificially altered, belong clearly to the brachycephalic type of people known already from the Menard and Greer cemeteries. A number of the deformed skulls, however, show distinctly that, were it not for the artificial shortening, they would have to be classed as mesocephalic or even as dolichocephalic. It is these skulls which remind one so forcibly of the cranial type known from some of the Pueblos. In the further treatment of the material it would be desirable to separate these skulls and the related bones from the crania and bones of the brachycephals; but, as the identification of these specimens, and particularly of the bones from the skeletons where no skull is present, is uncertain, and as there are probably also present intermediate forms due to admixture, such separation is not practicable.

Measurements.—The data obtained by measuring the skulls have been separated, as in last year's report, into several convenient groups. The tables (pp. 176, 177) present those that relate more directly to the form of the skull.

CRANIA FROM ARKANSAS—MEASUREMENTS RELATING TO FORM
FEMALES

Museum No.	Deformation	Diameter antero-posterior maximum	Diameter lateral maximum	Basion-bregma height	Cephalic index	Height-length index	Height-breadth index
255.120	.....	cm. 16.7	cm. 13.9	cm. ? (fair)	83.2	?	?
.143	.....	16.8	13.8	13.6	83.1	80.9	98.5
.148	.....	17.0	14.4	13.6	84.7	80.0	94.4
.122	Moderate fronto-occ. comp.	(16.3)	(15.0)	?	?	.....	.....
.129	Moderate occ. comp.	(16.6)	(about 14.3)	(about 14.5)	(Meso- or dolichocephal)	.....	.....
.130	Slight frontal with moderate occ. comp.	(15.8)	(14.6)	(13.6)	?	.....	.....
.144	Slight frontal with pronounced occ. comp.	(15.4)	(15.3)	(13.6)	?	.....	.....
.146	Slight fronto-occ. comp.	(16.1)	(14.6)	?	(Probably brachycephal)		
.147	Slight fronto-occ. comp.	(16.9)	(14.7)	(12.7)	?		
.151	Slight occ. comp.	(16.6)	(14.7)	?	?		

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The non-deformed skulls, it is seen, besides being rounded, are all relatively high, in which respect they further resemble those from Arkansas and Jefferson counties, described in last year's report; and there can be no doubt that they belong to the same general group of people. From additional material in the National Museum, it appears that the same type prevailed also in Drew and Mississippi counties, Arkansas.

The deformed specimens show varying grades of compensation in breadth and height for the artificially diminished length, the skull acting under the process much like an elastic bag filled with liquid. The several deformed crania which permit the discernment of a more oblong type represent doubtless a mixture of the above, dominant, with a strong additional tribal element. Similar oblong heads occur also in parts of Drew and Mississippi counties. Furthermore, from Pecan Point, and from near Bardstone, in the latter county, there are extant individual non-deformed skulls, of an unknown period, presenting the type of the eastern and southeastern Algonquian crania.

Size.—The principal dimensions of the crania from Boytt's Field agree fairly well with those observed in the skulls from the Menard and Greer cemeteries, but

MEASUREMENTS OF THE ARKANSAS CRANIA RELATIVE TO THEIR SIZE.

Museum No.	Sex	Deformity	Capacity*	Cranial module (mean diameter)	Circumference (above supra-orbital ridges)	Nasion-opisthion arc	Thickness of left parietal (above squamous suture)
			c.c.	cm.	cm.	cm.	mm.
255.119	Male	None	1475	15.17	50.1	35.0	4-6
.126	"	"	? (fair)	15.47	50.9	35.0	5
.149	"	"	? (submedium)	15.03	49.0	35.0	4-6
.121	"	Occipital flattening	1310	14.87	48.5	?	4-6
.123	"	"	? (medium)	?	49.1	36.2	4-6
.124	"	Fronto-occ. flattening	1480	15.37	49.3	34.1	4-6
.125	"	Occipital flattening	1315	15.10	49.3	35.7	4-6
.127	"	Fronto-occ. flattening	1455	15.30	48.0	34.4	4-6
.128	"	"	? (fair)	?	49.3	?	4-6
.141	"	Occipital flattening	1670	15.83	52.7	37.3	5-6
.145	"	"	? (medium)	?	52.3	?	4-6
.150	"	"	1470	15.60	50.1	35.5	5-7
.152	"	Fronto-occ. flattening	? (fair)	15.83	51.3	34.3	5-7
.120	Female	None	? (medium)	?	47.5	33.3	4-6
.143	"	"	"	14.73	47.7	35.0	5-7
.148	"	"	? (fair)	15.00	49.6	35.1	4-6
.122	"	Fronto-occ. flattening	? (medium)	?	48.2	32.7	5
.129	"	Occipital flattening	"	15.13	49.0	35.2	5-7
.130	"	Fronto-occ. flattening	"	14.67	47.7	34.0	4-6
.144	"	"	"	14.77	48.3	?	5-7
.146	"	"	"	?	48.5	?	4-6
.147	"	"	"	14.77	49.5	34.2	4-6
.151	"	Occipital flattening	1280	?	48.8	?	(6-7)
Averages (with minima and maxima)	Males	.....	7)† 1455 (1310-1670)	10) 15.36 (14.87-15.83)	13) 50.0 (48.0-52.7)	10) 35.2 (34.1-37.3)	13) 5 (4-6 to 5-7)
	Females	.....	.....	6) 14.84 (14.67-15.13)	10) 48.5 (47.5-49.6)	7) 34.2 (32.7-35.2)	9) 5.3 (4-6 to 5-7)

* Measured with dry mustard-seed in accordance with the writer's method described in *Science*, N. S., xvii, June 26, 1903, pp. 1011-1014.
† Number of cases.

there are also a few that are more capacious. Only one of the specimens, however, can be termed large, namely that of 1670 c.c. capacity. In 15 additional Arkansas crania in the National Museum, in which it could be determined, the capacity ranges in 9 males from 1360 to 1600 c.c., and in 6 females from 1180 to 1395 c.c.

The capacity of the skull generally bears a relation to the stature of the individual, and the stature can be judged approximately from the long-bones, particularly the humerus and the femur. One or both of the femora are present in five of the males with known skull capacity. Their length and relations to the capacity are as follows:

RELATION OF SKULL CAPACITY TO STATURE			
Male Skull No.	Cranial Capacity	Bicondylar length of right femur of same individual	Femoro-cranial index (= c. c. of skull capacity per 1.0 cm. of femoral length)
255.121	c. c. 1310	cm. 45.7	28.7
.125	1315	43.3	30.4
.127	1455	42.1	34.6
.124	1480	46.0	32.2
.141	1670	48.2	34.6
Averages	1446	45.1	32.1

These interesting data unfortunately apply to too few specimens to be of great value, particularly for type comparison. It may be stated, however, that the average bicondylar length of the right femur in the white American male of the Eastern states approaches 45.0 cm., and the cranial capacity 1500 c.c., which would give an average femoro-cranial index of about 33.3, a figure slightly higher than that in these Indians.

The average module (mean diameter of the skull), the greatest horizontal circumference above the ridges, and the nasion-opisthion arc, all show in both sexes slightly lower averages than in whites. The thickness of the parietal bone is not excessive, but it will be noticed that it averages slightly more in the females than in the males, even if we omit the unusually thick skull No. 255.151. This is not general among Indians, although rather thick female crania are met with in all the larger Indian skeletal collections.

The relation in the two sexes, of the average module, and of the circumference and antero-posterior arc, is almost identical for the three measurements, being as 96 (females) to 100 (males) for the module, and as 97 to 100 for both the other measurements.

For capacity, however, the difference in the relation would be larger.

Facial parts.—It is regrettable that the facial parts of many of the skulls, including nearly all the females, are imperfect or wanting. Nevertheless, those that remain show a number of features of considerable interest. In the first place the facial measurements, and especially the indices, are considerably alike throughout the series, notwithstanding evident diversity in the form of the crania. Sec-

two sexes, averaging 120° (107° to 128°) in ten males, and 122° (110° to 128°) in eight females. It is clear that the lower jaw, except for its slightly smaller dimensions, is of little use for sexual identification in this series of skulls.

Observations on the Crania.

The descriptive notes concerning the Arkansas skulls present so many similarities to those bearing on the skulls from Louisiana that the two can be treated together. They will therefore be found reported on in the section following that dealing with measurements of the Louisiana crania.

The same applies also to the long-bones and the other bones of the skeletons, which will be described together in a later section.

ADDITIONAL MEASUREMENTS OF THE ARKANSAS CRANIA WITH REFERENCE TO THE FACIAL AND OTHER PARTS OF THE SKULL																
Museum No.	Sex	Deformation of vault	PROGNATHISM *						FRONTAL BONE			FORAMEN MAGNUM	LOWER JAW			
			Basion-alveolar point diameter (a)	Basion-nasion diameter	Angle between a and alveolar point-nasion line	Basion-middle of nasal notches diameter	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b	Diameter frontal minimum (a)	Diameter frontal maximum (b)	Percental relation of a to b $(\frac{a \times 100}{b})$		Mean diameter	Diameter bigonial	Angle right left	Height at symphysis
255.119	Male	—	cm. 10.0	cm. 10.2	degrees 71	cm. 8.9	cm. 2.05	degrees 51	cm. 10.2	cm. 12.2	83.6	cm. 3.3	cm. 10.5	degrees ?	119	cm. 3.6
.126	"	—	10.7	11.0	72	9.7	2.25	56	10.0	12.1	82.6	?	11.2	121	120	3.9
.149	"	—	10.0	10.2	71	9.2	2.3	62	8.7	11.3	77.0	?	9.9	127	128	3.9
.121	"	o. c.	10.2	10.3	71	9.2	2.1	55	9.3	?	?	?	?	?	?	?
.123	"	o. c.	?	?	?	?	?	?	9.8	?	?	?	?	117	?	3.7
.124	"	f-o. c.	10.4	10.0	66	9.0	2.3	48	9.8	?	?	3.3	?	?	?	?
.125	"	o. c.	9.9	10.1	70	8.8	2.4	55	9.3	(11.8)	.....	?	10.9	124	?	3.6
.127	"	f-o. c.	9.8	10.1	72	9.2	2.1	67	9.7	(12.4)	.....	3.0	9.9	127	126	3.5
.128	"	f-o. c.	?	?	?	?	?	?	9.6	(12.9)	.....	?	?	?	?	?
.141	"	o. c.	10.3	10.7	74	9.1	2.2	50	9.8	(12.9)	.....	3.5	10.2	107	112	3.5
.145	"	o. c.	?	?	?	?	?	?	9.9	(12.4)	.....	?	10.4	125	?	3.9
.150	"	o. c.	10.1	10.6	73	9.0	2.1	53	9.6	(11.6)	.....	3.4	10.6	119	119	3.2
.152	"	f-o. c.	10.4	10.6	71	9.3	2.1	53	9.4	(12.8)	.....	3.3	11.1	?	112	3.6
.120	Female	—	?	?	?	?	2.3	?	8.7	11.0	79.1	?	9.5	122	119	3.6
.143	"	—	?	9.5	?	?	?	?	8.6	11.0	78.2	3.0	9.6	127	127	3.5
.148	"	—	?	10.2	?	?	?	?	10.2	11.8	86.4	3.3	?	?	119	3.5
.122	"	f-o. c.	?	?	?	?	?	?	9.3	(12.2)	.....	?	?	?	?	?
.129	"	o. c.	?	?	?	?	2.5	?	9.1	(11.9)	.....	?	9.8	?	124	?
.130	"	f-o. c.	?	9.9	?	?	1.85	?	9.0	(11.6)	.....	3.1	10.5	126	125	3.1
.144	"	f-o. c.	?	?	?	?	?	?	9.3	(12.0)	.....	?	10.7	128	127	3.6
.146	"	f-o. c.	?	?	?	?	?	?	10.0	(11.9)	.....	?	9.6	121	?	3.5
.147	"	f-o. c.	?	9.7	?	?	?	?	9.1	(11.6)	.....	?	9.6	110	113	3.5
.151	"	o. c.	?	?	?	?	?	?	9.4	(12.2)	.....	?	?	?	?	?

* Certain errors due to the employment of the sliding compass having crept into the determinations of the facial angles and sub-nasal height of the skulls from the Menard and Greer cemeteries described last year, those determinations are here repeated with corrections:

Museum No.	Angle between a and alveolar point-nasion line	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b
249.915	degrees 74	cm. 2.3	degrees 60
.921	71	2.2	51
.922	72	2.4	58
.916	64	2.9	54
.923	73	1.7	52
.924	66	2.45	51
.925	70	2.1	56

III.

LOUISIANA.

Mr. Moore's collection from Louisiana in 1909 came from several localities which are given with the list of specimens in the table below.

LOUISIANA SKULLS AND BONES					
Locality	Specimen	Original No.	Museum No.	Sex	Stage of life of person *
Harrelson Landing, Caldwell Parish	Skull and bones	1	255.094	Female	Aged adult
" "	Bones	7	.099	Male	Adult
" "	"	10	.098	"	"
" "	Skull and bones	11	.095	Female	Young adult
" "	Bones	12	.096	"	Adult
" "	"	13	.097	"	"
Bell Gin Landing	Bones	—	.100	Male	"
" "	"	—	.100a	"	"
Myatt's Landing, Ouachita Parish	Skull and bones	A	.102	"	Young adult
" "	Bones	A	.102a	"	Adult
" "	Skull	9	.118	Female	Middle-age adult
" "	Bones	15	.108	"	Adult
" "	Skull and bones	19	.111	"	Young adult
" "	Skull	20	.113	"	Middle-age adult
" "	"	21	.117	"	Near adult
" "	"	22	.116	"	Young adult
" "	"	23	.115	Male	Aged adult
" "	Skull and bones	24	.106	"	Middle-age adult
" "	Bones	26	.110	"	Adult
" "	Skull and bones	27	.105	Female	Middle-age adult
" "	Bones	29	.109	Male	Adult
" "	Skull and bones	30	.104	"	Middle-age adult
" "	"	31	.103	Female	"
" "	"	32	.112	"	Aged adult
" "	"	36	.107	Male	Young adult
" "	Skull	38	.114	"	Middle-age adult
Jones Landing, Franklin Parish	Skull	—	.153	Female (negroid)	"
" "	"	—	.154	Male	"
Bray Landing, Morehouse Parish	Skull and bones	16	.201	"	"
" "	Skull	—	.202	Female	Young adult
" "	"	—	.203	Male	Aged adult
" "	"	—	.204	"	Middle-age adult
" "	Bones (a lot)	—	.205	Males and females	All adults
Mound Landing, Morehouse Parish	Skull and bones	1	.207	Female	Middle-age adult
Ward Place, Morehouse Parish	Skull and bones	1	.217	Male	Aged adult
" "	"	2	.218	"	Middle-age adult
" "	Bones	4	.227	Female	Adult
" "	"	5	.226	"	"
" "	Skull and bones	6	.219	"	Middle-age adult
" "	"	7	.211	Male	"
" "	"	8	.210	"	"
" "	"	9	.216	Female	Young adult
" "	"	10	.220	"	Middle-age adult
" "	"	12	.215	Male	"
" "	"	13	.213	Female	Young adult
" "	"	14	.209	Male	Middle-age adult
" "	Bones	15	.222	"	Adult
" "	"	16	.221	"	"
" "	"	17	.224	"	"
" "	"	18	.225	Female	"
" "	"	19	.223	Male	"
" "	"	20	.214	Female	"
" "	"	22	.212	"	"
" "	Skull	31	.208	"	Middle-age adult

* For explanation of terms used, see the similar table pertaining to Arkansas, page 175.

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two sexes, averaging 120° (107° to 128°) in ten males, and 122° (110° to 128°) in eight females. It is clear that the lower jaw, except for its slightly smaller dimensions, is of little use for sexual identification in this series of skulls.

Observations on the Crania.

The descriptive notes concerning the Arkansas skulls present so many similarities to those bearing on the skulls from Louisiana that the two can be treated together. They will therefore be found reported on in the section following that dealing with measurements of the Louisiana crania.

The same applies also to the long-bones and the other bones of the skeletons, which will be described together in a later section.

ADDITIONAL MEASUREMENTS OF THE ARKANSAS CRANIA WITH REFERENCE TO THE FACIAL AND OTHER PARTS OF THE SKULL																
Museum No.	Sex	Deformation of vault	PROGNATHISM *						FRONTAL BONE			FORAMEN MAGNUM	LOWER JAW			
			Basion-alveolar point diameter (a)	Basion-nasion diameter	Angle between a and alveolar point-nasion line	Basion-middle of nasal notches diameter	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b	Diameter frontal minimum (a)	Diameter frontal maximum (b)	Percental relation of a to b $\left(\frac{a \times 100}{b}\right)$	Mean diameter	Diameter bigonial	Angle right left	Height at symphysis	
255.119	Male	—	cm. 10.0	cm. 10.2	degrees 71	cm. 8.9	cm. 2.05	degrees 51	cm. 10.2	cm. 12.2	83.6	cm. 3.3	cm. 10.5	?	119	cm. 3.6
.126	"	—	10.7	11.0	72	9.7	2.25	56	10.0	12.1	82.6	?	11.2	121	120	3.9
.149	"	—	10.0	10.2	71	9.2	2.3	62	8.7	11.3	77.0	?	9.9	127	128	3.9
.121	"	o. c.	10.2	10.3	71	9.2	2.1	55	9.3	?	?	?	?	?	?	?
.123	"	o. c.	?	?	?	?	?	?	9.8	?	?	?	?	117	?	3.7
.124	"	f-o. c.	10.4	10.0	66	9.0	2.3	48	9.8	?	?	3.3	?	?	?	?
.125	"	o. c.	9.9	10.1	70	8.8	2.4	55	9.3	(11.8)	.....	?	10.9	124	?	3.6
.127	"	f-o. c.	9.8	10.1	72	9.2	2.1	67	9.7	(12.4)	.....	3.0	9.9	127	126	3.5
.128	"	f-o. c.	?	?	?	?	?	?	9.6	(12.9)	.....	?	?	?	?	?
.141	"	o. c.	10.3	10.7	74	9.1	2.2	50	9.8	(12.9)	.....	3.5	10.2	107	112	3.5
.145	"	o. c.	?	?	?	?	?	?	9.9	(12.4)	.....	?	10.4	125	?	3.9
.150	"	o. c.	10.1	10.6	73	9.0	2.1	53	9.6	(11.6)	.....	3.4	10.6	119	119	3.2
.152	"	f-o. c.	10.4	10.6	71	9.3	2.1	53	9.4	(12.8)	.....	3.3	11.1	?	112	3.6
.120	Female	—	?	?	?	?	2.3	?	8.7	11.0	79.1	?	9.5	122	119	3.6
.143	"	—	?	9.5	?	?	?	?	8.6	11.0	78.2	3.0	9.6	127	127	3.5
.148	"	—	?	10.2	?	?	?	?	10.2	11.8	86.4	3.3	?	?	119	3.5
.122	"	f-o. c.	?	?	?	?	?	?	9.3	(12.2)	.....	?	?	?	?	?
.129	"	o. c.	?	?	?	?	2.5	?	9.1	(11.9)	.....	?	9.8	?	124	?
.130	"	f-o. c.	?	9.9	?	?	1.85	?	9.0	(11.6)	.....	3.1	10.5	126	125	3.1
.144	"	f-o. c.	?	?	?	?	?	?	9.3	(12.0)	.....	?	10.7	128	127	3.6
.146	"	f-o. c.	?	?	?	?	?	?	10.0	(11.9)	.....	?	9.6	121	?	3.5
.147	"	f-o. c.	?	9.7	?	?	?	?	9.1	(11.6)	.....	?	9.6	110	113	3.5
.151	"	o. c.	?	?	?	?	?	?	9.4	(12.2)	.....	?	?	?	?	?

* Certain errors due to the employment of the sliding compass having crept into the determinations of the facial angles and sub-nasal height of the skulls from the Menard and Greer cemeteries described last year, those determinations are here repeated with corrections :

Museum No.	Angle between a and alveolar point-nasion line	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b
249.915	degrees 74	cm. 2.3	degrees 60
.921	71	2.2	51
.922	72	2.4	58
.916	64	2.9	54
.923	73	1.7	52
.924	66	2.45	51
.925	70	2.1	56

III.

LOUISIANA.

Mr. Moore's collection from Louisiana in 1909 came from several localities which are given with the list of specimens in the table below.

LOUISIANA SKULLS AND BONES					
Locality	Specimen	Original No.	Museum No.	Sex	Stage of life of person *
Harrelson Landing, Caldwell Parish	Skull and bones	1	255.094	Female	Aged adult
" "	Bones	7	.099	Male	Adult
" "	"	10	.098	"	"
" "	Skull and bones	11	.095	Female	Young adult
" "	Bones	12	.096	"	Adult
" "	"	13	.097	"	"
Bell Gin Landing	Bones	—	.100	Male	"
" "	"	—	.100a	"	"
Myatt's Landing, Ouachita Parish	Skull and bones	A	.102	"	Young adult
" "	Bones	A	.102a	"	Adult
" "	Skull	9	.118	Female	Middle-age adult
" "	Bones	15	.108	"	Adult
" "	Skull and bones	19	.111	"	Young adult
" "	Skull	20	.113	"	Middle-age adult
" "	"	21	.117	"	Near adult
" "	"	22	.116	"	Young adult
" "	"	23	.115	Male	Aged adult
" "	Skull and bones	24	.106	"	Middle-age adult
" "	Bones	26	.110	"	Adult
" "	Skull and bones	27	.105	Female	Middle-age adult
" "	Bones	29	.109	Male	Adult
" "	Skull and bones	30	.104	"	Middle-age adult
" "	"	31	.103	Female	"
" "	"	32	.112	"	Aged adult
" "	"	36	.107	Male	Young adult
" "	Skull	38	.114	"	Middle-age adult
Jones Landing, Franklin Parish	Skull	—	.153	Female (negroid)	"
" "	"	—	.154	Male	"
Bray Landing, Morehouse Parish	Skull and bones	16	.201	"	"
" "	Skull	—	.202	Female	Young adult
" "	"	—	.203	Male	Aged adult
" "	"	—	.204	"	Middle-age adult
" "	Bones (a lot)	—	.205	Males and females	All adults
Mound Landing, Morehouse Parish	Skull and bones	1	.207	Female	Middle-age adult
Ward Place, Morehouse Parish	Skull and bones	1	.217	Male	Aged adult
" "	"	2	.218	"	Middle-age adult
" "	Bones	4	.227	Female	Adult
" "	"	5	.226	"	"
" "	Skull and bones	6	.219	"	Middle-age adult
" "	"	7	.211	Male	"
" "	"	8	.210	"	"
" "	"	9	.216	Female	Young adult
" "	"	10	.220	"	Middle-age adult
" "	"	12	.215	Male	"
" "	"	13	.213	Female	Young adult
" "	"	14	.209	Male	Middle-age adult
" "	Bones	15	.222	"	Adult
" "	"	16	.221	"	"
" "	"	17	.224	"	"
" "	"	18	.225	Female	"
" "	"	19	.223	Male	"
" "	"	20	.214	Female	"
" "	"	22	.212	"	"
" "	Skull	31	.208	"	Middle-age adult

* For explanation of terms used, see the similar table pertaining to Arkansas, page 175.

There are seventeen male and eighteen female skulls. Including all the bones, however, thirty male and twenty-eight female individuals are represented.

With a single exception, these specimens are in a state of preservation similar to that of the Arkansas skeletal remains. The exception noted is the bones from Harrelson Landing, which are more resistant, and darker in color.

Deformations are again frequent. Of the male skulls, six are of normal shape, nine show various grades of occipital and two of fronto-occipital compression; among the skulls of females, six are non-deformed, eight have occipital flattening and four fronto-occipital compression.

An interesting fact is that the fronto-occipital deformation occurs in only one locality, namely, Ward Place, La. Its absence in several of the other localities may be merely accidental, due to the small number of specimens from these places. But in the fairly large series from Myatt's Landing, only occipital compression is detected. Notes regarding the grades of deformation are included with the first table of measurements.

Several of the skulls show evidence of disease; details of these are given in Section VI. Syphilis was undoubtedly present, as likewise were other pathological conditions, known already from the skeletal remains of Arkansas.

Anomalies of importance, as in the crania from Arkansas, are limited in number. In male skull No. 255.106 the basilar process shows a deep lateral fissure on the left side and a similar condition in a lesser degree on the right (Fig. 4, y); the same specimen shows also a small medio-basilar or "pharyngeal" fossa. Male skull 255.154 exhibits a very pronounced occipital torus, with a marked depression above its middle for a ligamentous or tendinous insertion. Male skull 255.203 shows an epactal or "interparietal" bone, 6.7 cm. broad and 4.5 cm. high. Male skull 255.218 has a pronounced semilunar occipital crest, and a depression of good size in the median line above it. Female skull 255.094 shows a marked bilateral depression extending antero-posteriorly over three-fifths of the surface of each parietal, between the temporal ridges and the sagittal region, due to senile diminution of nourishment of these portions and their consequent absorption. In female skull 255.118 there is a large third condyle with an articular facet; and in female skull 255.103 we find on the right a paramastoid process, 0.9 cm. high and equally stout, which articulated with the atlas. On the left side of female skull 255.212 there is a large wedge-like, separate ossicle, 2.2 cm. in length by 0.5 cm. in average breadth, between the wing of the sphenoid and the glenoid portion of the temporal bone. This separate piece includes the sphenoid spine (spinous process). Female skull 255.213 shows a pronounced depression, 3.3 by 3.0 cm. in extent, above inion; it is of the same character as the depressions in crania 255.154 and 255.218, and as those of a number of skulls in the Arkansas collection of 1908, and no doubt served for a ligamentous or tendinous attachment. In female skull 255.214 there is a marked non-articular tubercle immediately back of each occipital condyle. Finally, the lower jaw of female skull 255.220 shows on each side an abnormally large and cleft-like dental foramen.

Other minor anomalies are enumerated under "Observations" (page 197).

MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THEIR FORM									
Museum No.	Locality	Sex	Deformation	Diameter antero-posterior maximum	Diameter lateral maximum	Basion-bregma height	Cephalic index	Height-length index	Height-breadth index
255,094	Harrelson Landing	Female	—	cm. 17.6	cm. 14.4	cm. ? (good)	81.8	?	?
.095	"	"	—	17.6	14.1	14.5	80.1	82.4	102.8
.107	Myatt's Landing	Male	—	18.2	15.1	? (good)	83.0	?	?
.114	"	"	—	18.2	14.3	14.4	78.6	79.1	100.7
.102	"	"	Moderate occipital compression	(17.2)	(14.0)	?	.....	.....	.....
.104	"	"	Slight occ. comp.	(16.5)	(14.8)	(14.1)	(brachycephal)	.....	.....
.106	"	"	Pronounced occ. comp.	(16.0)	(15.5)	(14.6)	.....	.....	.....
.111	"	"	Slight occ. comp.	(16.6)	(14.3)	?	(brachycephal)	.....	.....
.115	"	"	Moderate occ. comp.	(16.9)	(14.7)	(14.3)	.....	.....	.....
.113	"	Female	—	16.6	14.7	14.1	88.5	84.9	95.9
.116	"	"	—	16.6	13.8	13.6	83.1	81.9	98.5
.103	"	"	Moderate occ. comp.	(16.0)	(14.3)	(13.5)	.....	.....	.....
.105	"	"	Slight occ. comp.	(17.6)	(14.5)	(13.8)	(brachycephal)	.....	.....
.112	"	"	Slight occ. comp.	(16.8)	(14.6)	(14.3)	"	.....	.....
.117	"	"	Slight occ. comp.	(16.3)	(14.9)	(14.1)	"	.....	.....
.118	"	"	Moderate occ. comp.	(16.6)	(14.2)	(14.6)	(meso- or slightly brachycephal)	.....	.....
.154	Jones Landing	Male	—	18.3	14.2	15.3	77.6	83.6	107.7
.203	Bray Landing	Male	—	17.6	14.3	14.8	81.2	84.1	103.5
.204	"	"	—	17.3	15.1	15.0	87.3	86.7	99.3
.201	"	"	Slight occ. comp.	(17.7)	(15.2)	(14.5)	(brachycephal)	.....	.....
.202	"	Female	Moderate occ. comp.	(16.5)	(15.0)	(14.0)	(brachycephal)	.....	.....
.207	Mound Landing	Female	—	16.2	14.5	14.3	89.5	88.3	98.6
.211	Ward Place	Male	—	18.1	14.5	14.5	80.1	80.1	100.0
.209	"	"	Moderate occ. comp.	(16.8)	(15.5)	?	(brachycephal)	.....	.....
.210	"	"	Moderate fronto-occ. comp.	(16.5)	(14.7)	?	.....	.....	.....
.215	"	"	Lateral mod. fronto-occ. comp.	(17.7)	(15.1)	(14.2)	(probably brachycephal)	.....	.....
.217	"	"	Moderate occ. comp.	(17.1)	(14.6)	(14.8)	.....	.....	.....
.218	"	"	Moderate occ. comp.	(16.3)	(15.1)	?	.....	.....	.....
.213	"	Female	—	16.6	13.6	13.6	81.9	81.9	100.0
.208	"	"	Slight fronto-occ. comp.	(16.5)	(13.9)	(12.5)	.....	.....	.....
.212	"	"	Pronounced occ. comp.	(15.7)	(14.6)	(13.6)	.....	.....	.....
.214	"	"	Slight frontal with pronounced occ. comp.	(15.5)	(14.9)	(13.7)	.....	.....	.....
.216	"	"	Slight frontal with pronounced occ. comp.	(16.6)	(14.9)	(13.4)	.....	.....	.....
.219	"	"	Slight frontal with moderate occ. comp.	(16.1)	(14.5)	(13.2)	.....	.....	.....
.220	"	"	Medium occ. comp.	(15.5)	(14.5)	(14.0)	.....	.....	.....

The Form of the Louisiana Skulls.—In form the Louisiana crania show a predominance of the same brachycephalic type as that of the majority of skulls from Arkansas; but there are likewise some more oblong heads, which are similar in their turn to those of like form from Arkansas. The longer forms appear among the non-deformed Louisiana skulls, and are suspected also in several of the deformed crania. Besides these two types there are undoubtedly also intermediate forms resulting from admixture.

The height of the skulls for the greater part is quite considerable, as is the case with the skulls from Arkansas.

The principal measurements with reference to the form of the crania are given on p. 185.

Two features shown by the preceding table, which deserve special notice are the height-length and height-breadth indices. The former index averages 82.7 in the males, and 84.3 in the females; the latter 102.2 in the males, and 99.1 in the females. All of these averages, but particularly those of the height-length index, are extraordinarily high and are met with even among the Indians only in certain restricted areas.

The Size of the Louisiana Skulls.—In size there is again a fair agreement between the crania from Louisiana and those from Arkansas. A number of the male skulls and one female specimen show, as seen from the following table, very fair capacity (between 1500 and 1600 c.c.); but there are also crania, both male and female, of but very moderate capacity. In the case of female skull 255.208 the capacity is decidedly small, though such examples are not uncommon in the American race. The average capacity of the twelve male crania is 1460 (1350–1580) c.c.; that of the 7 female skulls, 1310 (1130–1390) c.c. In comparison with this, all the available Arkansas crania the capacity of which could be determined, comprising 19 males and 14 females, give an average of 1455 (1260–1670) c.c. for the males and 1255 (1140–1395) c.c. for the females. The differences between the two areas are not very material, but, so far as they obtain, they favor Louisiana. They are noticeably more pronounced in the females than in the males. This interesting condition may be incidental to the small number of specimens, particularly in the series from Louisiana; yet it deserves attention. Similar differences are noted in all the measurements bearing on the size of the vault in the two series of skulls.

The percental relation between the capacity of the female and that of the male crania, the latter being taken as 100, amounts in Louisiana to 89.7, in Arkansas to 86.3. This shows that the female skulls in these groups are not only absolutely larger in Louisiana than in Arkansas, but that they are also relatively larger, when compared with the males, than they are in the other State. This rather strengthens the possibility that the high average capacity of the Louisiana female skulls is accidental.

The percentage of difference between the capacity of the male and female crania is higher than that shown by any other of the principal external measurements of the vault. This will be shown more clearly in the succeeding pages.

MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THEIR SIZE								
Museum No.	Locality	Sex	Deformity *	Capacity	Cranial module (= mean diameter)	Circumference maximum (above supra-orbital ridges)	Nasion-opisthion arc	Thickness of left parietal (above squamous suture)
255.094	Harrelson Landing	Female	—	c. c. ?	cm. ?	cm. 50.8	cm. 36.9	mm. 4-5
.095	"	"	—	1370	15.40	50.0	37.0	4-7
.107	Myatt's Landing	Male	—	?	?	51.7	36.4	4-7
.114	"	"	—	1545	15.63	51.7	36.0	4-6
.102	"	"	o. c.	?	?	?	?	4-6
.104	"	"	"	?	15.13	49.3	33.6	5-7
.106	"	"	"	1420	15.37	49.7	34.3	4-7
.111	"	"	"	1390	15.23	48.5	34.8	5-7
.115	"	"	"	1350	15.30	49.3	34.7	5-7
.113	"	Female	—	?	15.13	49.7	36.0	4-5
.116	"	"	—	?	14.67	48.7	35.0	3-6
.103	"	"	o. c.	?	14.60	48.0	33.2	3-5
.105	"	"	"	1410	15.30	52.2	36.2	5-7
.112	"	"	"	1390	15.23	50.3	35.0	5-7
.117	"	"	"	?	15.10	49.3	33.8	3-5
.118	"	"	"	?	15.13	49.3	36.8	4-7
.154	Jones Landing	Male	—	1560	15.93	51.6	38.5	5-7
.203	Bray Landing	Male	—	?	15.57	50.1	?	4-5
.204	"	"	—	1580	15.80	51.2	35.9	5-6
.201	"	"	o. c.	1570	15.80	52.3	37.2	5-6
.202	"	Female	"	?	15.17	50.0	35.7	4-5
.207	Mound Landing	Female	—	?	15.00	47.9	33.3	4-6
.211	Ward Place	Male	—	1470	15.70	51.0	35.6	4-7
.209	"	"	o. c.	?	?	50.9	34.2	4-6
.210	"	"	f-o.c.	1420	?	48.8	?	4-5
.215	"	"	"	1400	15.67	51.2	36.0	5-8
.217	"	"	o. c.	1440	15.50	49.5	34.4	4-7
.218	"	"	"	1350	?	49.6	?	5-6
.213	"	Female	—	1215	14.60	47.2	34.3	5-7
.208	"	"	f-o.c.	1130	14.30	47.0	33.4	4-5
.212	"	"	o. c.	1330	14.63	47.3	33.3	4-6
.214	"	"	f-o.c.	1390	14.70	47.6	33.3	4-5
.216	"	"	"	1325	14.97	48.0	33.5	4-6
.219	"	"	"	?	14.60	47.1	?	4-6
.220	"	"	o. c.	?	14.67	47.7	?	3-4

* O. c. = occipital compression; f-o. c. = fronto-occipital compression.

The relation of the capacity to stature, the latter represented by the length of the femur, was determinable in 7 of the male and 5 of the female skulls from Louisiana, and the results are given in the following table. The relation, it is seen, is not without its variations, but it should prove of considerable interest when established in large series of skeletons.

The number of Indian specimens available is not satisfactory for a comparison of the capacity-stature relation with that in whites; nevertheless, by including the data on the Arkansas skulls given in the previous section and accepting 33.3 as the approximate average femoro-cranial index in white males, it is found that of twelve male Indian skulls only three show an index greater than that of whites of the same sex, while in nine it is lesser. In all probability a lesser femoro-cranial index than that of whites exists throughout among the Indians, though there will be individual exceptions. This means that the well known lower average cranial capacity of the Indian is not due to smaller stature.

The cranial module (mean diameter) and the measurements of circumference

RELATION OF SKULL CAPACITY TO STATURE			
Skull No.	Cranial Capacity	Bicondylar length of right femur	Femoro-cranial index (= c. c. of skull capacity per 1.0 cm. of femoral length)
Males	c. c.	cm.	
255.218	1350	45.0 (left)	30.1
.111	1390	44.7	31.1
.210	1420	43.1	32.9
.106	1420	43.0 (left)	33.0
.217	1440	44.7	32.2
.211	1470	44.6	33.0
.201	1570	45.5	34.5
Females			
255.213	1215	42.0	28.9
.216	1325	40.6	32.6
.212	1330	43.1	30.9
.214	1390	41.4	33.6
.112	1390	41.2	33.7

maximum and of the nasion-opisthion arc are given next to show their relative value in comparison with the capacity. Reference to the tabulated data shows that the measurements most closely expressing or representing the size of the skull, after capacity, are the cranial module and the circumference, the nasion-opisthion arc offering greater variability. The necessity of measuring the thickness of the cranial vault in each case where the actual capacity can not be determined is apparent. This measurement, as taken in this series, *i. e.*, along a line 1.0 cm. above the temporo-parietal suture, is not perfect, but it has the advantage that it can be taken with the compass used for other skull measurements. It would be preferable to determine the thickness of the parietal along a line running from before backward nearer or at its middle, but this would require a special instrument.

Results of considerable interest are obtained by comparing the averages of the principal external measurements of the skull which relate to its size, in all the available collections from Arkansas and Louisiana, and by contrasting them in the two sexes. According to these averages, which also are given in the next table, the Louisiana crania, of both males and females, show the largest external dimensions, while those from the Menard and Greer cemeteries in Arkansas show the smallest. This result agrees in the main with the determinations relating to the internal size of the skulls. The differences, however, on the whole are very moderate, and it is quite probable that in at least some of the groups they are accidental, due to the small number of specimens.

The average thickness of the skulls is in every series except that from Boytt's Field, Arkansas, noticeably smaller in the females than in the males. The male crania from the Menard and Greer cemeteries show the highest average thickness, but they are represented by only three specimens; the female skulls from that locality are not exceptional. The next in thickness are the male skulls from Louis-

COMPARISON OF THE AVERAGES OF PRINCIPAL CRANIAL MEASUREMENTS RELATING TO THE SIZE OF THE SKULL, EXCLUSIVE OF CAPACITY.														
Locality	MALES					FEMALES					MALES		FEMALES	
	Num-ber of speci-mens	Average cranial module (mean diameter)	Num-ber of speci-mens	Average cir-cumference (maximum, above supra-orbital ridges)	Num-ber of speci-mens	Average nasion-opis-thion arc	Num-ber of speci-mens	Average cranial module	Num-ber of speci-mens	Average circumfer-ence (maxi-mum, above supraorbital ridges)	Num-ber of speci-mens	Average nasion-opisthion arc	Num-ber of speci-mens	Average thickness of parietal 1 cm. above tempo-ri- parietal suture
Arkansas: Menard and Greer cemeteries, Jefferson and Mississippi counties	3	15.47 (15.28-15.83)	3	50.8 (49.9-51.8)	3	34.5 (33.8-35.2)	7	14.82 (14.40-15.07)	7	48.0 (46.3-49.1)	7	33.2 (32.3-33.9)	3	6.0 (4-6 to 6-7)
Arkansas: Boytt's Field, Union county	10	15.36 (14.87-15.83)	13	50.0 (48.0-52.7)	10	35.2 (34.1-37.3)	6	14.84 (14.67-15.13)	10	48.5 (47.5-49.6)	7	34.2 (32.7-35.2)	13	5.0 (4-6 to 5-7)
Arkansas: Earlier National Museum material from Drew and Mississippi counties	16	15.54 (15.10-16.07)	21	50.2 (48.3-53.0)	21	35.6 (32.6-37.9)	11	14.81 (14.53-15.20)	11	48.1 (47.3-49.9)	9	34.1 (31.7-35.4)	22	5.0 (3-4 to 5-8)
Louisiana	12	15.55 (15.13-15.93)	16	50.4 (48.5-52.3)	13	35.5 (33.6-38.5)	17	14.90 (14.30-15.40)	18	48.8 (47.0-52.2)	16	34.8 (33.2-37.0)	17	5.5 (4-5 to 5-8)
RELATION OF AVERAGES IN FEMALE AND MALE SKULLS (MALE SKULLS = 100).														
Locality	Cranial module	Circumference	Nasion-opisthion arc	Locality	Cranial module	Circumference	Nasion-opisthion arc							
Arkansas: Menard and Greer cemeteries, Jefferson and Mississippi counties	96	94.5	96	Arkansas: Earlier National Museum material from Drew and Mississippi counties.	95.5	96	96							
Arkansas: Boytt's Field, Union county	96	97	97	Louisiana	96	97	98							

MEASUREMENTS OF THE LOUISIANA CRANIA WITH REFERENCE TO THE FACIAL PARTS

Museum No.	Locality	Sex	Deformation of vault	Total height of face	Alveolar point-nasion height	Diameter bizygomatic maximum	Facial index, total	Facial index, upper	Nose, height (mean from nasion to the nasal notches)	Nose, breadth maximum	Nose, index	Orbits, height		Orbits, breadth		Orbits, index		Palate, external length	Palate, external breadth	Palate, index
												right	left	right	left	right	left			
255,094	Harrelson Landing	Female	—	cm. ?	cm. ?	cm. 12.8	? 84.3	? 50.7	cm. ? 4.85	cm. ? 2.3	? 47.4	cm. ? 3.6	cm. ? 3.5	cm. ? 3.9	cm. ? 3.8	? 92.3	? 92.1	cm. ? 5.4	cm. ? 6.0	? 111.1
.095	“	“	—	11.3	6.8	13.4	? 84.3	50.7	4.85	2.3	47.4	3.6	3.5	3.9	3.8	? 92.3	? 92.1	5.4	6.0	? 111.1
.107	Myatt's Landing	Male	—	? 12.8	7.4	? 14.3	? 89.5	55.2	5.2	2.35	45.4	? 3.7	? 3.6	? 4.05	? 4.1	? 91.4	? 87.8	5.7	6.4	? 112.3
.114	“	“	—	? 11.5	7.9	? 13.7	? 83.9	51.8	5.4	2.6	48.1	3.7	3.6	4.05	4.1	? 91.4	? 87.8	5.8	6.6	? 113.8
.102	“	“	o. c.	? 11.5	? 7.1	? 14.1	? 83.9	51.8	5.1	2.3	52.9	3.6	3.6	3.6	3.6	? 100.0	? 100.0	5.5	6.2	? 112.7
.104	“	“	o. c.	? 11.5	? 7.1	? 14.1	? 83.9	51.8	5.1	2.3	52.9	3.6	3.6	3.6	3.6	? 100.0	? 100.0	5.5	6.2	? 112.7
.106	“	“	o. c.	? 11.5	? 7.1	? 14.1	? 83.9	51.8	5.1	2.3	52.9	3.6	3.6	3.6	3.6	? 100.0	? 100.0	5.5	6.2	? 112.7
.111	“	“	o. c.	? 11.5	? 7.1	? 14.1	? 83.9	51.8	5.1	2.3	52.9	3.6	3.6	3.6	3.6	? 100.0	? 100.0	5.5	6.2	? 112.7
.115	“	“	o. c.	? 11.5	? 7.1	? 14.1	? 83.9	51.8	5.1	2.3	52.9	3.6	3.6	3.6	3.6	? 100.0	? 100.0	5.5	6.2	? 112.7
.113	“	Female	—	11.2	7.2	? 14.5	? 83.9	54.5	4.5	2.5	48.1	3.85	3.85	4.15	4.05	? 92.8	? 95.1	5.7	6.8	? 119.3
.116	“	“	—	12.2	7.3	? 13.1	? 83.9	54.5	5.2	2.6	57.8	? 3.85	? 3.85	? 4.15	? 4.05	? 92.8	? 95.1	5.7	6.8	? 119.3
.103	“	“	o. c.	? 7.0	7.0	? 13.1	? 83.9	54.5	5.15	2.6	50.5	? 3.4	? 3.4	? 3.75	? 3.8	? 90.7	? 89.5	5.6	6.5	? 116.1
.105	“	“	o. c.	? 7.0	7.0	? 13.1	? 83.9	54.5	4.85	2.5	51.5	3.4	3.4	3.75	3.8	? 90.7	? 89.5	5.6	6.5	? 116.1
.112	“	“	o. c.	? 6.9	6.9	? 13.4	? 83.9	54.5	4.8	2.45	49.5	3.3	3.4	3.9	3.8	? 84.6	? 89.5	5.4	6.8	? 125.9
.117	“	“	o. c.	11.7	6.9	? 13.4	? 83.9	54.5	4.95	2.6	53.1	3.45	3.55	4.0	4.0	? 86.2	? 88.7	5.4	6.8	? 125.9
.118	“	“	o. c.	? 8.0	? 7.0	? 13.4	? 83.9	54.5	5.1	2.6	49.0	? 3.45	? 3.55	? 4.0	? 4.0	? 86.2	? 88.7	5.7	6.7	? 117.5
.154	Jones Landing	Male	—	? 13.4	8.0	? 14.6	? 83.9	54.5	5.4	2.5	49.0	? 3.45	? 3.55	? 4.0	? 4.0	? 86.2	? 88.7	5.7	6.7	? 117.5
.203	Bray Landing	Male	—	? 13.4	8.0	? 14.6	? 83.9	54.5	5.4	2.5	49.0	? 3.45	? 3.55	? 4.0	? 4.0	? 86.2	? 88.7	5.7	6.7	? 117.5
.204	“	“	—	? 13.4	8.0	? 14.6	? 83.9	54.5	5.4	2.5	49.0	? 3.45	? 3.55	? 4.0	? 4.0	? 86.2	? 88.7	5.7	6.7	? 117.5
.201	“	“	—	? 13.4	8.0	? 14.6	? 83.9	54.5	5.4	2.5	49.0	? 3.45	? 3.55	? 4.0	? 4.0	? 86.2	? 88.7	5.7	6.7	? 117.5
.202	“	Female	o. c.	11.9	7.0	14.6	81.5	47.9	4.95	2.7	54.5	? 3.3	? 3.4	? 3.8	? 3.7	? 86.8	? 91.9	5.4	6.6	? 122.2
.207	“	Female	o. c.	11.0	6.6	13.6	80.9	48.5	4.75	2.85	49.5	3.3	3.4	3.8	3.7	? 86.8	? 91.9	5.6	6.6	? 117.9
.209	Mound Landing	Male	—	11.3	6.8	14.6	87.0	54.8	5.0	2.5	50.0	3.4	3.5	4.4	4.2	? 77.3	? 83.3	6.1	6.8	? 111.5
.211	Ward Place	“	—	12.7	8.0	14.6	87.0	54.8	5.5	2.75	50.0	3.4	3.5	4.4	4.2	? 77.3	? 83.3	6.1	6.8	? 111.5
.209	“	“	o. c.	? 12.1	7.4	? 13.4	? 90.3	55.2	5.05	2.4	47.5	3.65	3.75	4.0	3.9	? 91.2	? 96.1	5.5	6.5	? 118.2
.210	“	“	o. c.	12.1	7.4	13.4	90.3	55.2	4.9	2.4	47.5	3.65	3.75	4.0	3.9	? 91.2	? 96.1	5.5	6.5	? 118.2
.215	“	“	o. c.	12.0	7.4	14.4	83.3	51.4	5.45	2.6	53.1	3.4	3.4	3.9	3.8	? 87.2	? 89.5	6.0	6.5	? 108.3
.217	“	“	o. c.	? 12.0	? 7.4	? 14.4	? 83.3	51.4	5.45	2.6	53.1	3.4	3.4	3.9	3.8	? 87.2	? 89.5	6.0	6.5	? 108.3
.218	“	“	o. c.	? 11.7	7.5	14.6	? 83.3	51.4	5.3	2.3	56.6	3.6	3.75	4.2	4.0	? 90.0	? 92.5	? 5.4	? 6.1	? 113.0
.213	“	Female	—	11.7	7.1	13.8	90.0	51.6	4.8	2.7	56.2	3.35	3.4	3.65	3.55	? 90.7	? 95.8	5.4	6.1	? 113.0
.208	“	“	o. c.	10.6	6.6	13.8	79.7	49.6	4.85	2.7	55.7	3.4	3.35	3.85	3.85	? 85.7	? 87.0	4.9	6.2	? 126.5
.212	“	“	o. c.	? 10.6	6.6	13.8	79.7	49.6	4.85	2.7	55.7	3.4	3.35	3.85	3.85	? 85.7	? 87.0	4.9	6.2	? 126.5
.214	“	“	o. c.	? 11.2	7.2	13.6	83.6	50.7	4.9	2.35	48.0	3.65	3.65	3.8	3.75	? 93.4	? 97.3	5.1	6.5	? 127.4
.216	“	“	o. c.	11.2	7.2	13.4	83.6	50.7	4.95	2.7	54.5	3.5	3.5	3.7	3.75	? 94.6	? 93.3	5.6	6.8	? 121.4
.219	“	“	o. c.	? 6.5	6.5	13.5	83.6	50.7	4.75	2.85	60.0	? 3.5	? 3.5	? 3.7	? 3.75	? 94.6	? 93.3	5.6	6.8	? 121.4
.220	“	“	o. c.	? 13.4	6.5	13.4	83.6	50.7	4.65	2.85	61.3	3.45	3.45	3.95	3.8	? 87.4	? 90.8	? 5.6	? 6.8	? 121.4

iana; this has a bearing on their relatively large external size, as compared with the other groups of erania, with only a slightly larger capacity.

The percental relation of female to male averages of the principal external measurements of the vault presents considerable likeness in the four localities, and is much alike in the separate measurements. Larger numbers of specimens would doubtless reduce further some of the irregularities. As already alluded to, these sexual indices exceed considerably the similar indices of cranial capacity. This is due partly to the relatively great thickness of the female skulls and partly to other conditions. It will be of importance to determine these relations with respect to other groups of American aborigines as well as to other races.

THE FACIAL PARTS.

Facial Dimensions.—In the majority of the Louisiana erania the facial parts unfortunately are injured, yet enough remains to show that in this series the face is somewhat higher and broader than is the case with the skulls from Boytt's Field, Arkansas: it more nearly approaches the specimens from the Menard and Greer cemeteries. The relative proportions of the face, *i. e.*, the facial indices, show much similarity in all these groups, as is evident from the table on page 190. Nevertheless, the facial indices, especially the upper, are perceptibly lower in the crania from Boytt's Field than in the others, and in addition the averages of all the facial measurements of the skulls from this locality are lower than those of the other series. This relative smallness of the face of the former inhabitants of the Boytt's Field region was probably a local peculiarity.

COMPARISON OF FACIAL DIMENSIONS OF MALE SKULLS FROM LOUISIANA AND ARKANSAS

Locality	Number of Cases	Average total facial height	Number of Cases	Average upper facial height	Number of Cases	Average diameter bizygomatic maximum	Number of Cases	Average total facial index	Number of Cases	Average upper facial index
Louisiana (a)	7	cm. 12.35 (11.5-13.4)	10	cm. 7.55 (7.0-8.0)	9	cm. 14.2 (13.4-14.6)	6	86 (81.5-90.3)	8	53 (51.4-55.2)
Arkansas (b): Menard and Greer cemeteries	1	12.4	1	7.7	2	14.55 (14.5-14.6)	1	85	1	53
Arkansas (c): Boytt's Field	9	11.75 (11.3-12.2)	11	7.05 (6.8-7.3)	8	13.85 (13.3-14.3)	7	85 (81.5-90.3)	8	51 (47.9-55.2)
Arkansas (d): Drew and Mississippi counties	3	12.5 (12.1-13.1)	11	7.6 (7.0-8.2)	10	13.95 (13.5-14.6)	2	86 (84.2-88.3)	7	54.5 (52.1-60.7)

(a) The average height of the upper face in 13 female skulls from Louisiana is 6.88 cm.; in 5 from Arkansas (b), 7.35 cm.; in 5 from Arkansas (c), 6.93 cm.; and in 5 from Arkansas (d), 7.06 cm.

The average proportions and the index of the *nose* in the several groups of skulls from Louisiana and Arkansas bear close resemblance; nevertheless it will be noticed from the following table that there are certain local differences. These are due particularly to the unequal average height of the nose, which in turn is owing largely to differences in the height of the upper face. Thus the greatest average

height of the nose occurs in crania from the Menard and Greer group and in the male skulls from Drew and Mississippi counties, Arkansas, and these two series show also the lowest average nasal index. On the other hand, the lowest nose with the highest nasal index is found in the Boytt's Field crania, in which the face, as has been previously mentioned, also was exceptionally low. The average breadth of the nose differs less than the height in the various groups of skulls under consideration.

As to sexual differences, the three larger groups of crania show, as is usual in Indians, a lower average nasal index in the males than in the females. Similar difference exists also in whites and in other races, and is due to the fact that the height of the upper face is relatively less in the females, as compared with males, than its breadth.

COMPARISON OF NASAL DIMENSIONS				
Sex and Locality	Number of individuals	Nose : average height	Nose : average breadth	Nasal index: average
Males				
Louisiana	13	cm. 5.16 (4.5-5.5)	cm. 2.62 (2.3-3.0)	50.95 (45.4-57.8)
Arkansas: Boytt's Field	11	4.98 (4.7-5.35)	2.54 (2.35-2.8)	51.05 (46.7-53.8)
Arkansas: Menard and Greer cemeteries	2	5.22	2.62	50.25
Arkansas: Drew and Mississippi counties	13	5.49 (5.05-5.80)	2.69 (2.45-2.95)	49.40 (45.6-54.5)
Females				
Louisiana	15	4.87 (4.65-5.3)	2.56 (2.3-2.85)	52.65 (46.9-61.3)
Arkansas: Boytt's Field	4	4.70 (4.4-4.9)	2.57 (2.5-2.7)	54.80 (52.1-60.0)
Arkansas: Menard and Greer cemeteries	5	5.15 (4.9-5.3)	2.50 (2.4-2.6)	48.55 (45.3-51.0)
Arkansas: Drew and Mississippi counties	7	4.96 (4.7-5.2)	2.61 (2.45-2.70)	52.70 (49.0-57.4)

The *orbital* height in the Louisiana skulls ranges from 3.4 to 3.85 cm., and the breadth from 3.6 to 4.4 cm. In the females the variations are: height 3.3 to 3.65 cm., breadth 3.55 to 4.0 cm. The index varies from 77.3 to 100.0 in the male skulls, and from 84.6 to 97.3 in the female crania. The majority of the specimens are megaseme; but the value of the orbital dimensions and indices in many of the artificially deformed skulls is problematic. It is certain that in some cases of fronto-occipital compression the deformation has the effect of heightening and possibly also of narrowing the orbits. The simple occipital compression is less influential; nevertheless, when of a higher degree, it is not without an effect on the orbital measurements.

In some cases both the measurements and the indices of the two orbits differ quite appreciably, and in a majority of these instances the index of the left orbit is the larger. Thus, of the eighteen crania in which the index could be determined, it was equal in two, larger on the right side in four, and larger on the left side in twelve. Similar differences were noted in the measurements of the Arkansas series; they exist also among Indians elsewhere, and have been found in whites.

The *palate* in the Louisiana skulls is in the males predominantly mesuranic, in the females mainly brachyuranic. Its average indices are brachyuranic, and

show, as do the average measurements, considerable likeness to those of the three other series of skulls available for comparison. The higher indices in the female than in the male crania of the Louisiana group are apparently exceptional. The locality differences, shown in the following table, are so irregular that no definite significance can be attached to them.

PALATE: COMPARISON OF AVERAGE MEASUREMENTS AND INDICES				
Sex and Locality	Number of specimens	External length of the palate (Turner), averages	Greatest external breadth of the palate, averages	Palatal index, averages
Males				
Louisiana	10	cm. 5.75 (5.4-6.1)	cm. 6.65 (6.2-7.3)	116 (108.3-122.2)
Arkansas: Boytt's Field	12	5.57 (5.3-6.0)	6.56 (6.1-7.1)	118 (108.6-126.8)
Arkansas: Menard and Greer cemeteries	1	5.80	6.90	119
Arkansas: Drew and Mississippi counties	7	5.75 (5.6-5.8)	7.02 (6.55-7.40)	122 (113.0-128.6)
Females				
Louisiana	9	5.35 (4.9-5.6)	6.50 (6.0-6.8)	122 (111.1-127.4)
Arkansas: Boytt's Field	2	5.65	6.45	115
Arkansas: Menard and Greer cemeteries	5	5.71 (5.35-6.2)	6.80 (6.55-7.1)	119 (114.5-127.1)
Arkansas: Drew and Mississippi counties	5	5.44 (5.1-5.7)	6.37 (5.95-6.75)	117 (104.4-133.9)

Additional Measurements of the Facial and Other Parts of the Skull.

The individual data are here given, as in the case of the Arkansas crania, in a separate table, in order to facilitate their possible use according to secondary localities or other standards. Thus presented they will also render easier the study of the effects of deformation on some of the measurements, particularly the diameter frontal maximum (see page 194).

Prognathism.—For the Louisiana series of skulls the measurements pertaining to facial and alveolar prognathism give an average basi-facial angle in each sex of 70° , with an average alveolar angle of 55.5° in the males and 52° in the females. The alveolar process in the females is somewhat more slanting, but it either does not increase or it increases but little the total facial protrusion. As will be seen in the next table the measurements and angles relative to this feature show a close similarity to those obtained on the Arkansas series, particularly the skulls from Boytt's Field. The basi-facial angle presents remarkably small variation, both within the individual series and in the separate groups.

The Frontal Bone.—As in some of the Arkansas specimens, the smallest frontal breadth is decidedly low in some of the Louisiana skulls, and it never exceeds moderate dimensions.

The averages given below show, as usual, a perceptibly larger diameter frontal minimum in the males than in the females; and there is a close similarity in the measurement of the Louisiana series and the crania from Boytt's Field, Arkansas.

ADDITIONAL MEASUREMENTS OF THE LOUISIANA CRANIA PERTAINING TO THE FACIAL AND OTHER PARTS OF THE SKULL.																		
Museum No.	Locality	Sex	Deformation of vault	PROGNATHISM					FRONTAL BONE			FORAMEN MAGNUM	LOWER JAW					
				Basion-alveolar point diameter (a)	Basion-nasion diameter	Angle between a and alveolar point-nasion line	Basion-middle notch diameter	Height from alveolar point to middle of nasal notches (b)	Angle between a and line b	Diameter frontal minimum (a)	Diameter frontal maximum (b)		Pericentral relation of a to b	Mean diameter	Diameter bigonial	Angle		Height at symphysis
																right	left	
255.094	Harrelson Landing	Female	—	cm. ?	cm. ?	degrees ?	cm. ?	cm. ?	degrees ?	cm. ?	cm. ?	cm. ?	cm. ?	degrees 134	degrees ?	cm. ?		
.095	"	"	—	10.2	10.7	75	8.9	2.25	50	9.5	11.1	85.6	3.15	10.2	?	3.5		
.107	Myatt's Landing	Male	—	?	?	?	?	?	?	9.2	12.3	74.8	?	?	?	?		
.114	"	"	—	11.0	11.1	69	9.8	2.6	56	10.0	12.2	82.0	3.5	11.3	?	4.0		
.102	"	"	o. c.	?	?	?	?	?	61	9.3	?	?	?	112	?	?		
.104	"	"	o. c.	10.1	10.6	73	9.3	2.1	?	8.5	(11.7)	?	3.3	9.5	?	3.7		
.106	"	"	o. c.	?	10.2	?	?	?	?	9.3	(12.7)	?	3.35	120	?	3.5		
.111	"	"	o. c.	?	?	?	?	?	?	9.8	(12.3)	?	?	120	?	?		
.115	"	"	o. c.	?	?	?	?	?	?	9.8	(11.9)	?	3.5	131	?	?		
.113	"	Female	—	10.2	10.5	70	9.1	2.75	58	9.8	(12.4)	?	3.05	127	?	3.3		
.116	"	"	—	?	9.9	?	?	?	?	9.8	12.0	75.0	3.35	?	?	3.2		
.103	"	"	—	?	9.7	?	?	?	?	9.0	12.0	?	3.0	120	?	3.2		
.105	"	"	o. c.	?	10.2	?	?	?	?	?	(11.4)	?	3.0	120	?	3.3		
.112	"	"	o. c.	?	9.9	?	8.2	?	?	9.8	(12.5)	?	3.15	120	?	3.3		
.117	"	"	o. c.	?	10.0	?	9.0	?	?	9.8	(12.5)	?	3.4	122	?	?		
.118	"	"	o. c.	?	9.9	?	?	?	?	9.4	(12.2)	?	3.5	118	?	3.6		
.154	Jones Landing	Male	—	?	10.2	?	9.1	?	?	9.8	(12.2)	?	?	?	?	?		
.203	Bray Landing	Male	—	?	11.0	?	?	?	?	9.7	11.9	81.5	3.3	117	?	3.7		
.204	"	"	—	?	10.4	?	?	?	?	9.2	11.7	78.6	?	117	?	3.4		
.201	"	"	—	10.5	10.5	68	9.1	2.7	52	10.2	12.8	79.7	3.4	115	?	4.4		
.202	"	"	o. c.	10.0	10.4	73	9.0	2.15	57	9.8	(12.7)	?	3.3	112	?	3.8		
.207	"	Female	o. c.	9.5	9.5	69	8.3	2.1	49	9.2	(12.4)	?	3.15	109	?	3.35		
.211	Mound Landing	Female	—	?	10.7	?	9.7	2.55	57	9.8	11.7	78.6	3.05	121	?	3.25		
.209	Ward Place	Male	—	10.8	10.8	68	9.7	?	?	9.8	11.8	83.0	3.45	112	?	3.8		
.210	"	"	—	?	?	?	?	?	?	9.5	(12.5)	?	?	112	?	3.8		
.215	"	"	f-o. c.	?	?	?	?	?	?	9.5	(12.5)	?	?	109	?	3.6		
.217	"	"	f-o. c.	10.6	10.4	68	9.0	2.7	48	9.6	(11.8)	?	?	118	?	3.8		
.218	"	"	f-o. c.	?	10.5	?	8.7	?	?	9.6	(12.4)	?	3.6	123	?	3.4		
.213	"	"	o. c.	?	?	?	?	?	?	9.8	(12.0)	?	3.7	118	?	?		
.208	"	Female	—	9.7	9.7	69	8.5	2.3	53	9.8	(12.1)	?	3.15	?	?	?		
.212	"	"	f-o. c.	?	9.2	?	?	?	?	8.3	11.3	73.5	3.05	?	?	3.7		
.214	"	"	o. c.	9.3	9.5	71	8.3	1.85	52	9.1	(10.8)	?	3.05	121	?	?		
.216	"	"	o. c.	9.4	9.5	71	8.3	2.15	52	9.2	(11.9)	?	3.15	125	?	?		
.219	"	"	f-o. c.	10.1	9.8	66	8.9	2.35	52	9.1	(12.2)	?	3.15	?	?	?		
.220	"	"	f-o. c.	?	9.7	?	?	?	?	9.5	(11.6)	?	3.25	117	?	3.4		
	"	"	o. c.	?	9.7	?	8.5	?	?	9.5	(11.7)	?	?	124	?	?		
	"	"	o. c.	?	9.6	?	?	?	?	?	(12.4)	?	?	116	?	3.4		

COMPARISON OF AVERAGE MEASUREMENTS AND INDICES RELATING TO PROGNATHISM							
Sex and Locality	Number of specimens	Average basion-alveolar point diameter	Average basion-nasion diameter	Average basion-middle of nasal notches diameter	Average height from alveolar point to middle of nasal notches	Average basifacial angle (between basion-alveolar point-nasion lines)	Average alveolar angle (between basion-alveolar point-nasal notches lines)
Males.							
Louisiana	7	cm. 10.5 (10.0-11.0)	cm. 10.6 (10.4-11.1)	cm. 9.3 (9.0-9.8)	cm. 2.5 (2.1-2.75)	degrees 70 (68-73)	degrees 55.5 (48-61)
Arkansas : Boytt's Field	10	10.2 (9.8-10.7)	10.4 (10.0-11.0)	9.1 (8.8-9.7)	2.2 (2.05-2.4)	71 (66-74)	55 (48-67)
Arkansas : Menard and Greer cemeteries	1	10.7	11.4	9.8	2.3	74	60
Arkansas : Drew and Mississippi counties	5	9.95 (9.5-10.5)	10.35 (10.0-10.7)	8.9 (8.5-9.5)	2.3 (2.0-2.5)	71 (67-73)	57 (56-58)
Females.							
Louisiana	6	9.7 (9.3-10.2)	9.8 (9.5-10.7)	8.5 (8.3-8.9)	2.2 (1.95-2.4)	70 (66-75)	52 (49-57)
Arkansas : Boytt's Field	4	?	9.8 (9.5-10.2)	?	?	?	?
Arkansas : Menard and Greer cemeteries	4	10.1 (9.4-10.6)	10.06 (9.9-10.2)	9.0 (8.5-9.3)	2.3 (1.7-2.9)	68 (64-73)	53 (51-56)
Arkansas : Drew and Mississippi counties	3	9.6 (9.4-10.0)	9.7 (9.5-9.8)	8.4 (8.3-8.6)	2.0 (1.85-2.15)	69 (66-71)	51 (49-53)*

* Two specimens.

This similarity extends, in all probability, to the Arkansas skulls collected in 1908, though the small number of specimens in the latter collection give somewhat unequal averages.

The diameter frontal maximum, which can be considered in only the undeformed specimens, averages perceptibly less in the female crania from both Louisiana and Arkansas than it does in the male skulls, but this is due merely to the smaller size of the female head. The average percental relation between the smallest and greatest frontal diameters is alike in the two sexes, though there appears a slight tendency toward a lower index in the female crania. The proportion between the two measurements is also very similar in the different localities.

Foramen Magnum.—In all the groups of skulls here considered the mean diameter of the foramen magnum shows a higher average in the males than in the females; and in both sexes it is slightly higher in the Louisiana crania than in either of the groups from Arkansas. So far as the sexes are concerned, these differences are due probably to the difference in stature, for this factor has a decided effect on the size of the foramen.

Lower Jaw.—In this series of skulls again, as in that from Arkansas, the lower jaw is of moderate dimensions throughout; yet the averages indicate that it is slightly higher than the lower jaws from Arkansas.

Both the breadth and the height of the lower jaw are, as may be expected, perceptibly less in the females than in the males, but there are individual exceptions in both sexes.

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FRONTAL BONE—FORAMEN MAGNUM—AVERAGE PROPORTIONS AND THEIR COMPARISON								
Sex and Locality	Number of specimens	Average diameter frontal minimum (a)	Number of specimens	Average diameter frontal maximum (b)	Number of specimens	Average percental relation of a to b	Number of specimens	Foramen magnum: average diameter
Males		cm.		cm.				cm.
Louisiana	17	9.6 (8.5-10.2)	6	12.1 (11.7-12.8)	6	80 (74.8-83.0)	10	3.45 (3.3-3.7)
Arkansas: Boytt's Field	13	9.6 (8.7-10.2)	3	11.9 (11.3-12.2)	3	81 (77.0-83.6)	6	3.3 (3.0-3.5)
Arkansas: Menard and Greer cemeteries	3	10.0 (9.8-10.15)	1	12.3	1	18	2	3.25 (3.15-3.35)
Arkansas: Drew and Mississippi counties	23	9.45 (8.4-10.7)	11	12.05 (11.4-13.3)	11	79.5 (73.7-84.9)	14	3.33 (3.05-3.7)
Females								
Louisiana	17	9.4 (8.3-9.9)	6	11.7 (11.1-12.0)	6	79 (73.5-85.6)	14	3.18 (3.0-3.5)
Arkansas: Boytt's Field	10	9.3 (8.6-10.2)	3	11.3 (11.0-11.8)	3	81 (78.2-86.4)	3	3.13 (3.0-3.3)
Arkansas: Menard and Greer cemeteries	7	9.2 (8.8-9.85)	4	11.9 (11.5-12.4)	4	77 (74.5-79.1)	5	3.15 (2.9-3.3)
Arkansas: Drew and Mississippi counties	13	9.15 (8.1-9.5)	7	11.5 (11.2-12.0)	7	79 (76.3-82.6)	8	3.14 (3.0-3.3)
LOWER JAW—AVERAGE DIMENSIONS AND COMPARISON								
Sex and Locality	Number of specimens	Average bigonial diameter	Number of specimens	Average angle	Number of specimens	Average height at symphysis		
Males		cm.		degrees		cm.		
Louisiana	11	10.7 (9.5-11.6)	13	118 (109-131)	11	3.75 (3.4-4.4)		
Arkansas: Boytt's Field	9	10.5 (9.9-11.2)	10	120 (112-128)	10	3.65 (3.2-3.9)		
Arkansas: Menard and Greer cemeteries	1	10.9	1	116.5	1	3.40		
Arkansas: Drew and Mississippi counties	8	10.7 (10.0-11.9)	8	118 (108-126)	7	3.65 (3.2-4.0)		
Females								
Louisiana	13	10.0 (9.1-11.3)	14	121 (109-134)	12	3.40 (3.2-3.7)		
Arkansas: Boytt's Field	7	9.9 (9.5-10.7)	8	122 (110-128)	7	3.47 (3.1-3.6)		
Arkansas: Menard and Greer cemeteries	4	9.95 (9.8-10.1)	3	125 (121-129)	3	3.30 (3.15-3.5)		

The angle of the lower jaw, which was measured whenever possible on both sides, was found—taking the Louisiana skulls of both sexes—equal on the two sides in two, larger on the right in six, and larger on the left in eight cases. Taking all the available specimens together, it was equal in five cases, larger on the right in twelve, and larger on the left in seventeen. These results seem to indicate that there is a slight tendency toward a larger angle on the left side.

The sexual differences are again very slight. In the averages the female lower jaws of all the groups show a slightly wider angle, but, as an aid in sexual identification in individual cases, that proportion in this particular region is of little value.

IV.

OBSERVATIONS ON THE ARKANSAS AND LOUISIANA CRANIA.

Cranial Vault.

The conformation of the vault differs, naturally, in accordance with the type of the skull. As to the non-deformed brachycephalic specimens, practically the same description will apply as was given in last year's report on the Menard and Greer crania: the forehead in these skulls is usually well built, though rather narrow in front; the sagittal region is either uniformly rounded from side to side or shows a small to moderate elevation along the sagittal suture; the parietal and occipital regions are uniformly convex, without any special protrusion of the parietal bossæ or of the mid-occipital region.

The temporal ridges, while usually fairly well marked, are in no case exceptional nor do they in any case approach near the sagittal line. On the occiput several of the specimens, mentioned specially in the paragraph on anomalies, show a pronounced, more or less extensive, torus. A number of skulls, including some of those with a torus, exhibit also a marked (in one case a very decided) depression in middle at and above the inion. This fossa is characteristic and is not accidental. It is observable in the Arkansas crania and occurs with greater or less rarity in Indian skulls from other parts of North America. It apparently served for an attachment either of a ligament (extreme part of the lig. nuchæ) or of portions of the trapezius muscle.

The more oblong Louisiana skulls are characterized: by a sagittal elevation more pronounced and broader than that occurring in the brachycephals, and this crest extends occasionally forward to the frontal bone; by the greater frequency of a low forehead; by lesser convexity of the parietal regions but greater distinctness of the eminences; and by more or less protrusion of the occiput.

Supra-orbital Ridges.

Compared with what may be regarded as the average in whites, the supra-orbital ridges in the two series of skulls under consideration appear as follows:¹

ARKANSAS			LOUISIANA	
	Males	Females	Males	Females
Small	4	6	2	6
Moderate	1	4	3	11
Well developed (about as medium in white males)	8	1	8	1
Pronounced	0	0	4	0

It is seen that of the male skulls (of the sexual determination of which there

¹ In 23 male and 13 female Arkansas skulls from the old collections in the National Museum, the condition of the supra-orbital ridges is: None, M. 0, F. 1; small, M. 3, F. 10; moderate, M. 8, F. 0; well developed, M. 10, F. 2; pronounced, M. 2.

can be no doubt in more than perhaps one instance) there are a number that show lack of development in these features, while on the other hand there are several female crania in which the ridges reach moderate dimensions, and two in which they approach closely in extent to what would be regarded as masculine. The rather limited development of the ridges in some of the males agrees with what has been observed in the 1908 series of skulls from Arkansas.

Mastoids.

As in the case of the Menard and Greer skulls, the mastoid processes in both the Arkansas and the Louisiana series often show only a moderate development in the males, while in the females they frequently exceed the average determined in the same sex in whites and in Indians from other regions. In detail the conditions, compared with white male and female standards respectively, are as follows:¹

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Small	1	0	5	0
Moderate to medium	11	2	6	11
Above medium	1	8	6	7

The rather strong development of these processes in the Arkansas and Louisiana females no doubt bears relation to a good development in this sex of the sternocleido-mastoid muscles, the growth of which was probably favored by the habitual carrying by these women of heavy jars and other burdens on their heads.

Sutures.

Serration.—The serration of the cranial sutures in Indians is generally less complicated than in the whites, and the Arkansas and Louisiana skulls here dealt with form no exception. The conditions are actually as follows:²

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Near medium in whites	3	0	5	0
Sub-medium (2-3 Broca)	6	7	10	11
More or less simple (1-2 Broca)	4	3	1	6

It is interesting to observe that the only skulls in which the serration approaches the approximate average in whites are those of males, and that, on the

¹ In 23 male and 12 females Arkansas skulls of the earlier National Museum collections, the mastoids are (male compared to male and female to female standards): Small, M. 6, F. 0; medium, M. 16, F. 8; above medium, M. 1, F. 4.

² In 22 male and 13 female Arkansas skulls from the earlier collections in the National Museum, the condition of the serration of sutures is: Near medium, M. 1, F. 0; sub-medium, M. 14, F. 8; more or less simple, M. 7, F. 5.

other hand, the simpler forms of the sutures are more frequent in the females in both of the groups. No regular relation has been observed between the grade of serration of the sutures and the size of the skull, though all the specimens in which the serration is best developed are large. Perhaps a very large series of skulls might produce more definite results.

Pterions.—In all the crania, with one exception, the pterions are of the H type, *i. e.*, the articulation is spheno-parietal. The exception occurs in female skull 255.213, from Louisiana, where on the left side the temporal squama forms a narrow articulation with the frontal. No relation is apparent between the width of the spheno-parietal articulation and the sex or the size of the skull. As to locality, the male skulls from Louisiana average broader pterions than those from Arkansas, but the female crania from the two localities present approximately the same conditions. The details are as follows:¹

ARKANSAS			LOUISIANA	
Pterion H-form	Males	Females	Males	Females
Broad	1	2	6	2
Medium	6	4	10	11
Narrow	3	1	0	2

Occlusion.—The order of external synostosis in the cranial sutures shows a number of interesting features as well as numerous irregularities. (See table, pp. 200, 201.)

The details show that, dorsally, synostosis begins in the majority of these crania in the coronal suture, and is followed in a short time by a similar process in the sagittal, temporo-occipital, and nasal sutures. The process next manifests itself in the greatest degree in the spheno-parietal and spheno-frontal articulations, and lastly in the lambdoid suture. The temporo-parietal articulation was found patent in all the specimens.

The table shows that there are numerous individual irregularities in the appearance and progress of the synostoses. In this particular series these irregularities are doubtless augmented by the effect of the artificial deformations.

As to localities in the different sutures at which synostosis begins, it was noticed that in the coronal it is almost invariably in the portions below and at the temporal ridges, following which points of obliteration appear along the median third of the suture; in the sagittal the most frequent points of beginning of the obliteration are the obelion and the summit; in the lambdoid it begins at various points in the median third and advances downward on each side; in the temporo-sphenoidal the parts that co-ossify earliest are the inferior portions; and in the nasal suture obliteration usually begins at its distal extremity. This fairly agrees with the results of observations on American crania from other localities.² The order of

¹ In 19 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the pterions is: H-Form—Broad, M. 0, F. 2; medium, M. 6, F. 5; sub-medium, M. 10, F. 3; Narrow, M. 2, F. 1; K-Form—None.

² See the writer's "Contribution to the Physical Anthropology of California," Berkeley, 1906, University of California Publications, Vol. 4, No. 2, table 5.

SYNOSTOSES OBSERVED IN THE ARKANSAS AND LOUISIANA SKULLS

ARKANSAS—MALES

Skull No.	Coronal suture: obliteration	Sagittal suture: obliteration	Lambdoid suture: obliteration	Temporo-occipital sutures: obliteration	Pteric sutures: obliteration	Fronto-sphenoidal sutures: obliteration	Nasal sutures: obliteration
255.119	None	None	None	None	None	None	Some
.121	Below ridges	About obelion and spots elsewhere	Marked traces	Fully	Fully	Fully	Fully
.123	None	None	None	None	None	None	None
.124	Below ridges	Traces about obelion	Few traces	Left fully; right patent	Fully	Fully	Traces
.125	On left from bregma to within 2.7 cm. above pterion; right patent	None	None	Most of right and some of left	None	None	Trace
.126	None	"	"	None	"	"	None
.127	"	"	"	"	"	"	"
.128	"	"	"	"	"	"	Traces
.141	At bregma below ridges	Nearly all	Median fourths	Both fully	For the greater part	For the greater part	For the greater part
.145	All	All	Nearly all	Left fully; right patent	?	?	?
.149	None	None	None	None	None	None	Nearly all
.150	Nearly all below ridges	Larger part	Some on the left	Third of left; right patent	Both	Both	"
.152	Below the ridges and in the median third	All	All but a short portion of each extremity	Half of right; left ?	?	?	All

ARKANSAS—FEMALES

Skull No.	Coronal suture: obliteration	Sagittal suture: obliteration	Lambdoid suture: obliteration	Temporo-occipital sutures: obliteration	Pteric sutures: obliteration	Fronto-sphenoidal sutures: obliteration	Nasal sutures: obliteration
255.120	None	None	None	None	None	None	Larger part
.122	"	"	"	"	"	"	?
.129	Nearly all below ridges	Anterior half	"	"	"	"	None
.130	None	None	"	"	"	"	"
.143	"	"	"	"	"	"	"
.144	"	"	"	"	"	"	"
.146	"	"	"	"	"	"	"
.147	"	"	"	"	"	"	?
.148	Considerable, especially below ridges	"	"	Some in left	"	"	Larger part
.151	On the left about temporal ridge	"	"	?	?	?	Some
				?	?	Both fully	Some

SYNOSTOSES: CONTINUED

LOUISIANA—MALES

255.102	None	None	None	? None	? None	? Lower third
.104	"	Some about obelion	Traces	"	"	"
.106	Traces on left below temporal ridge	Slight about obelion	"	"	"	"
.107	? None	None	None	"	"	None
.111	None	Nearly all	Traces	"	"	"
.114	All	Most	None	Inferior half of each left	? Both fully	Lower third
.115	All below ridges, some above	"	None	Inferior half of left	Right fully; left patent	Distal fourth
.154	All below ridges, some above	"	Most of median two-thirds	Inferior third of left; all of right	All	All
.201	All	All but posterior fifth	Middle third	Inferior three-fifths of each	? None	? Some
.203	Below the ridges	At numerous points	None	? Some in right	Some All	None
.204	None	None	"	Some in each	"	? Some
.209	Most	All	Median two-thirds	"	"	"
.210	Below the ridges	"	At numerous points	Inferior half of left	Left all; right patent	All
.211	All	"	Most	All	All	"
.215	Below the ridges	Nearly all	At some points	Inferior two-thirds of left	"	Inferior fourth
.217	None	At summit and obelion	Median three-fifths	Inferior three-fourths of each	? None	Some
.218	"	None	None	None	None	None

LOUISIANA—FEMALES

255.094	None	Some	None	None	? None	? None
.095	"	None	"	"	"	The tip
.103	"	"	"	"	Both fully	None
.105	On left below temporal ridge	About the summit	"	"	All	All
.112	Below the ridges and in points above	On the summit	Superior two-thirds of right side	Inferior three-fourths of left	Left fully; right patent	None (partly broken off)
.113	None	"	None	Inferior two-thirds of right	None	? None
.116	"	All	"	None	"	All
.117	"	None	"	"	Parts of each	None
.118	Below the ridges	"	"	Inferior fourth of left	None	None
.202	Advanced below ridges, especially on right	"	"	None	"	? None
.207	None, middle three-fifths	"	"	"	"	"
.268	None	Middle four-fifths	"	Traces in both	All	All
.212	"	None	Traces	None	None	Larger part
.213	"	"	None	Middle third of each	"	None
.214	"	"	"	None	"	"
.216	"	"	"	"	"	"
.219	"	"	"	Middle half of left	"	The tip
.220	"	"	"	None	"	None

occlusion among whites, according to data obtained by Hamy, Broca, and Topinard,¹ is sagittal, coronal below temporal ridges, lambdoid, coronal about bregma, and, finally, temporo-parietal. In all probability obliteration of the frontal suture commences earlier and advances more rapidly in the Indian than in the whites; however, the precise differences in these respects between the two races remain to be determined by further observation. According to the writer's experience there exist many individual variations in regard to suture occlusion in the whites also.

Sutural Bones.—If we except a few specimens, sutural bones are scarce in both the Arkansas and the Louisiana crania. The same was observed in the series of Arkansas skulls described in 1908, and is evident in the collections of crania from Arkansas and Louisiana already in the National Museum from other sources. In three of the Arkansas and six of the Louisiana skulls of the present series no Wormian or other sutural bones at all are present.

The sutural ossicles are not only few in number but they are generally small. They are found most frequently in the lambdoid, next in frequency being the temporo-occipital sutures and the squamo-mastoid angle. In two cases a sutural ossicle is present in the posterior extremity of the sagittal. In male skull 255.119, Arkansas, a small sutural bone exists between the two nasals; and in male skull 255.203, Louisiana, there is an epactal. In only two instances are there small epipteries.

FACIAL FEATURES.

Orbits.

On the whole the orbits show nothing extraordinary. They differ quite widely in individuals, as shown in the measurements of height. There are no cases of very massive or of square orbits.

Nasal Bones. Upper Maxillæ.

The *nasion depression* as a rule is fairly well marked in the males and more or less shallow in the females, being in both quite comparable with that in whites.

The *nasal bones* usually have fair breadth. An exception to this, accompanied with an abnormality of the right bone, has been mentioned (page 176), and there are two other cases in which the breadth of the bones is sub-medium.

The *nasal bridge* averages moderate height. There are no high noses, and in three of the skulls the bridge is rather low.

The *inferior nasal border* (that of the notches) is prevalently more or less dull, as seen from the following details:²

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Border sharp as average in whites	5	3	2	5
Somewhat dull	1	3	5	9
Dull	5	3	7	3

¹ Topinard, P., *Éléments d'Anthropologie Générale*, Paris, 1885, p. 645.

² In 14 male and 7 female Arkansas skulls of the old National Museum collections, the condition of the inferior nasal border is as follows: Border sharp, M. 7, F. 4; somewhat dull, M. 1, F. 0; dull, M. 5, F. 2; slight to moderate sub-nasal fossæ were present in M. 6 and F. 0.

In four additional cases the border is more or less dull on one side and sharp on the other. In one Arkansas male, one Arkansas female, and six Louisiana male crania, the dullness of the border is accompanied by small to well-marked sub-nasal fossæ; and in one Arkansas female and two Louisiana male skulls there are sub-nasal grooves or gutters. In an additional Louisiana male skull (No. 255.215) a slight sub-nasal fossa occurs on the right, and a moderate groove on the left. These two manifestations are doubtless only modes of the same structural tendency.

The *nasal spine* on the whole is less developed in Indian crania than in those of the whites, and the skulls of the series under consideration form no exception to this rule. They exhibit this feature as follows:¹

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Well-developed nasal spine (about as average in whites)	1	0	4	3
Sub-medium height as well as protrusion (= length)	8	7	7	9
No height and sub-medium protrusion	4	2	3	4

Prognathism has been treated under "Measurements." The protrusion of the alveolar processes ranges from what would be regarded as approximately medium in whites to that which is decidedly above such medium but does not equal the protrusion in the skulls of most members of the black races. In general the alveolar processes in the Arkansas and Louisiana skulls are regularly arched. There are no diastemæ, and, on the other hand, in a few cases only is there any crowding. (See under *Teeth*, page 208.)

Sub-orbital Fossæ.—By this term the writer designates the entire large depression extending over the anterior surface of the superior maxilla beneath the orbit and particularly beneath that portion of the malar bone which forms part of the lower border of the orbit. This depression, known imperfectly as the "canine fossa," is of some racial importance, since in some peoples it is generally much less developed than in others, and may even be wholly wanting, as in the case of many of the Eskimo. In Indians it often shows less depth than about the average in whites; yet there are also localities from which some of the Indian crania, at least, show sub-orbital fossæ of fair depth. As will be seen from the table (p. 204), this is somewhat the case in both the series of skulls under consideration.²

¹ In 13 male and 7 female Arkansas skulls from the old collections in the National Museum, the condition of the nasal spine is; Well developed, M. 4, F. 0; sub-medium height as well as protrusion, M. 6, F. 6; no height, sub-medium protrusion, M. 3, F. 1.

² In 13 male and 7 female skulls of the old National Museum collections, the condition of the sub-orbital fossæ is as follows: Well marked, M. 3, F. 5; sub-medium, M. 4, F. 1; shallow to absent, M. 6, F. 1.

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Well-marked	3	1	2	9
Sub-medium	3	3	4	6
Shallow to absent	5	3	6	2

The Lower Jaws.

The *lower jaws* are generally of moderate dimensions, and all have a moderate to fairly well-marked prominence of the chin. In the skulls of seven of the Arkansas males, three of the Arkansas females, seven of the Louisiana males, and seven of the Louisiana females, the chin is more or less square. The bone is generally of good strength, but in no case very massive. The angles show a pronounced eversion in one case only, the lower jaw of female skull 255.103, Louisiana.

Malar Bones. Zygomæ.

The *malar bones*, in both the Arkansas and the Louisiana series, generally show moderate to good development, and very few unusual features. The malar tuberosity, or torus is well marked in a few cases, and the same is true of the processus marginalis. None of the malar bones shows division, and there is not even a case of a marked fissure in the processus temporalis.

The *zygomæ* present nothing extraordinary.

Base of the Skull.

About the base of the skulls there are several features of racial significance to which attention has been directed by the writer already in several instances. These are, principally, the relative depression of the petrous portions of the temporal bones (as seen when the upturned skull is examined from above), and the size of the middle lacerated foramina. They are related to the development of the brain, vary, in general, directly with the mental activities of the individual, and their differences extend to entire groups of people.

In a man or woman of the white race who has been well educated and has been well above the average in mental activity, the development of the brain has affected the skull in such a manner that the more yielding parts surrounding the petrous portions have been pressed outward, leaving the petrous portions themselves in a decided depression; and as such skulls have also grown in breadth and length more than is usual, while the petrous portions remained unaltered, the middle lacerated foramina have become more spacious. In individuals in whom extraordinary mental activity, with consequent brain growth and skull expansion, has not been realized, the depression of the petrous portions and the size of the middle lacerated foramina remain small. In the child there is no depression of the former, and the

size of the latter is insignificant. In people belonging to races not characterized by extraordinary mental activity, such as the negroes and the Australians, the inferior surface of the petrous portions is either level with or but slightly below both the neighboring surfaces of the basilar process and the sphenoid bone, and the middle lacerated foramina range from very small to small. Occasionally in these cases a flattened portion of the apex of the petrous part extends clear over on to the body of the sphenoid, leaving but a small lateral aperture representing the middle lacerated foramen. In the anthropoid apes, even those whose skulls are best developed, the inferior surface of the petrous portions is slightly *raised* (as seen from above in the upturned skull) above the basilar process and the sphenoidal parts, while the foramina lacera media are either insignificant or entirely absent. Finally, in the lower monkeys and in quadrupeds there is a still more pronounced portion of the inferior part of the petrous wedge clear above (in upright position of the skull, below) the neighboring bone surfaces.

It is thus seen that these two features, namely, (1) the depression of the petrous portions within the other structures of the base, and (2) the grade of depression and the size of the middle lacerated foramina, are of significance and always worthy of attention. In the Indian they range in general from what would be about medium in whites to approximately the average in the African negro; but they differ somewhat according to locality. In the Arkansas and Louisiana crania of the present series, the conditions regarding these two features are as follows:¹

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
<i>Petrous Portions</i>				
Level or almost level with the neighboring surfaces	3	3	0	8
Slightly depressed	4	4	7	7
Moderately depressed	4	2	6	3
Well depressed	0	0	1	0
<i>Middle lacerated foramina</i>				
Small	4	5	3	11
Moderate	4	4	8	3

The smaller Arkansas group does not clearly show sexual differences, but in the Louisiana series the female skulls indicate a decidedly inferior character, that is, extraordinary brain development is exhibited less frequently than in the males. Somewhat similar differences exist, according to the writer's observations, also in the white race.

The *styloids* are more often imperfectly developed or wanting altogether in the Indians than in whites; but there are individuals in whom the styloids reach proportions that would be regarded as average or well developed in whites, and the number of such individuals may be larger in some localities than it is in others. In the Arkansas and Louisiana crania the conditions are as given in the table (p. 206).

Paramastoids.—A slight to moderate, non-articular, irregular elevation, between

¹ In 15 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the petrous portions is: Level, M. 1, F. 1; slightly depressed, M. 7, F. 9; moderately depressed, M. 5, F. 1; well depressed, M. 2, F. 0.

the distal end of the jugular process and the condyle, in the region of the insertion of the rectus capitis lateralis muscle, is frequently met with in Indian crania, and those of the series under discussion form no exception. On the other hand, a large cylindrical and articular process, while by no means unknown in the Indians, is of rare occurrence. Regarding the present series, two of the male and one of the female skulls from Louisiana show moderate non-articular paramastoids, while one cranium (female No. 255.103) has on the right side an articular process 0.9 cm. high and of equal diameter.¹

The *posterior condyloid foramina* are less often absent or diminutive in the Indian skulls from Arkansas and Louisiana than in those of whites. There are in all 28 skulls in which these structures can be examined, and of these they are normal

CONDITION OF STYLOIDS.*				
	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Styloids approxi- mately as well developed as in average whites of same sex	5	3	9	5
Sub-medium	3	2	1	5
Small	0	1	1	4
Rudimentary or absent (in lat- ter case only a small base be- ing visible)	2	5	2	2
Special	1 Right rudimentary ; left sub-medium 1 Right medium ; left rudimentary	—	1 Right sub-medium ; left only base 1 Right very small; left moderate 1 Right base only ; left medium 1 Right sub-medium ; left medium	1 Right moderate; left only base 1 Right only base ; left rudimentary

* In 20 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the styloids is as follows: Medium, M. 8, F. 1; sub-medium, M. 5, F. 0; rudimentary or absent, M. 4, F. 6. Special: Males, 1 = right, medium, left only base; 1 = no trace of even the bases; 1 = right rudimentary, left medium; Females, 1 = no trace of even the bases; 1 = right rudimentary, left medium; 1 = right sub-medium, left medium; 1 = right rudimentary, left base only.

in 23, or 82 per cent. Of the remaining 5 skulls, one of the canals is wholly occluded in two and partly occluded in three. The obliteration occurs in male as well as in female skulls; it is present twice on the right side and three times on the left.

The *jugular foramen* is found, as in whites, to be more frequently larger on the right side, as will be seen by the following table:²

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
About equal	1	1	3	3
Right larger	5	2	9	10
Left larger	3	2	2	1

¹ In 12 male and 10 female Arkansas skulls from the old collections in the National Museum, the condition of the para-mastoids is as follows: Moderate non-articular elevation on each side; M. 0, F. 2.

² In 20 male and 11 female Arkansas skulls from the old collections in the National Museum, the condition of the jugular foramina is: About equal, M. 0, F. 0; right larger, M. 18, F. 10; left larger, M. 2, F. 1.

The *spinous processes* in the collection under examination offer numerous irregularities, being sometimes unusually developed. The variations in this particular structure, though of no great importance, will well repay a separate thorough study.

A feature of frequent occurrence in skulls of Indians, as well as of whites, is the projections of bone arising on one side from the spinous process or the vicinity thereof, and on the other from the superior or inferior part of the external pterygoid plate. Occasionally these processes join and give rise to a pterygo-spinous or pterygo-sphenoidal foramen. The significance of these structures, notwithstanding the fact that they have long been well known to anatomists, and are recognized as being formed by ossification of fibrous bands connecting the different points, is not yet so clear as might be desired.

In the Arkansas and Louisiana crania a greater or lesser tendency toward the formation of the inferior pterygo-spinous foramen was observed, but other conditions, as indicated below, were likewise noted.

PTERYGO-SPINOUS FORAMINA.*				
	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Tendency to superior pterygo-spinous foramen, both sides	3	0	0	0
Tendency to inferior pterygo-spinous foramen:				
Right	1	0	1	3
Left	1	0	0	1
Both sides	0	0	2	5
Inferior pterygo-spinous foramen from three-fifths to nearly complete	255.119, right ?; left four-fifths	0	255.115, right half; left nearly complete	255.095, right nearly complete; and tendency also on each side to superior foramen
	255.141, right three-fifths; left four-fifths		255.211, right three-fifths; left three-fifths	255.105, right nearly complete; left nearly complete
	255.152, right ?; left nearly complete		255.215, right nearly complete; left nearly complete	
			255.217, right two-thirds; left nearly complete	
Inferior foramen complete	255.127, right complete; left nearly complete	255.143, pterygo-sphenoidal complete on left (tendency on right)	255.201, pterygo-spinous complete on left (slight tendency on right)	0
			255.218, pterygo-sphenoidal complete on each side	

* In 14 male and 7 female Arkansas skulls from the old collections in the National Museum, the condition of the pterygo-spinous foramina is as follows: No trace, M. 3, F. 1; tendency to superior, M. 2, F. 1; tendency to inferior, M. 9, F. 4; inferior complete, M. 1, F. 0; inferior lateral (pterygo-sphenoidal) complete, M. 0, F. 1.

Defects of ossification in the floor of the auditory meatus.—Of such defects, or dehiscences (Hyrtl), which are very frequent and often large in the case of Indians

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in some parts of the Western Hemisphere, particularly in Peru, the skulls from Arkansas and Louisiana show the following instances:¹

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
No defects	12	7	14	11
With defects	1	2	3	7

Of the 22 skulls from Arkansas, defects in the floor of the meatus are present in three (= 14 per cent.); of the 35 skulls from Louisiana, such defects are found in 10 (= 29 per cent.).

Taking into consideration the 10 Arkansas skulls described last year, and the 30 additional skulls in the National Museum collections—a total of 62 from that State—a unilateral or bilateral dehiscence is present in 10, or 16 per cent.

Unfortunately there are only 4 additional skulls from Louisiana in the Museum. Adding this number to those above given, it is found that of the 39 skulls from that State, 10 show a defect in the floor of the meatus, on one or both sides, or in 26 per cent. of the total. These figures indicate an excess of the abnormality in the Louisiana crania.

As to sex, the abnormality is more frequent in the females. Of the 30 male skulls in the present series it occurs in 4, or 13 per cent.; while of the 27 females it exists in 9, or 33 per cent. Taking all the available skulls from both Arkansas and Louisiana, aggregating 60 males and 47 females, 7 of the former, or approximately 12 per cent., and 12 of the latter, or nearly 26 per cent., exhibit the condition. These results illustrate that, at least in Arkansas and Louisiana, the defects of ossification in the floor of the auditory meatus are more than twice as common in the skulls of females as in those of males.

Teeth.

The condition of the *dentition* is shown in the table on page 209.

There is only a single instance of a supernumerary tooth (see under *Abnormalities of Teeth*); and there are no pronounced defects in the form of the teeth remaining and in condition for examination.

In *size* the teeth in every case are moderate, not exceeding the average in whites. This applies to all except the third molars, which occasionally are small. (See the details following.)

More or less *wear* is exhibited in the teeth of all the skulls. It is evident that this process commences early in adult life, and occasionally before. No case of extreme wear came to notice. In a number of the crania the wear of the teeth is not uniform over the whole denture.

¹ In 22 male and 10 female skulls from Arkansas of the old collections in the National Museum, such defects are as follows: No defects, M. 19, F. 8; small to moderate defects, M. 3, F. 2.

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Dentition complete above; (below ?)	2	0	2	1
Complete below; (above ?)	0	2	2	1
Complete above and below	8	2	6	7
Defects	255.123, upper third left molar never erupted; below complete	255.129, upper complete; lower third molar never erupted	255.104, upper third right molar never erupted; lower complete	255.113, upper third left molar never erupted; right ?
	255.128, upper complete; lower third molars never erupted	255.147, upper ?; lower third right molar never erupted	255.210, upper third right molar never erupted; lower ?	255.216, upper third molars never erupted; lower complete
	255.152, upper third molar never erupted; lower complete			

The *upper incisors*, when present and well preserved, show generally the shovel-like, sharply outlined ventral concavity so characteristic of these teeth in the Indians, and to which attention has hitherto been called by the writer.

The number and the morphological characters of the *cusps* on the molars, when the latter are sufficiently preserved to permit observation, resemble those in whites. The number of cusps on the different molars is as follows :

CUSPID FORMULÆ OF THE MOLARS													
	Museum No.	UPPER						LOWER					
		Right			Left			Right			Left		
		1st	2d	3d	1st	2d	3d	1st	2d	3d	1st	2d	3d
Arkansas Males	225.124	4	3½*	3	4	4	?			?			
	.126	4	4	3	?	?	?	5	4	4½	5	4	4½
	.127	4	4	3	4	4	?	5	4½	6	5	4½	?
	.145	4	3½	3	4	3½	3	5	?	?	5	?	?
	.150	4	3½	3	4	3½	3	5	4	4½	5	4	4½
Arkansas Females	255.130	4	3	3	4	3	3	5	4	4½	5	4	3½
Louisiana Males	255.107	4	3½	3	4	3	IRREG- ULAR	?	?	?	?	?	?
Louisiana Females	255.116	4	3	?	4	3	“	5	4	4	5	4	4
	.117	4	4	?	4	4	“	5	4	3½	5	4	4½
	.202	4	4	3	4	4	?	5	5	?	5	5	?

* Cusps designated by halves are those decidedly smaller than the regular cusps, yet clearly marked. The upper figure in each case expresses the number of these small cusps.

Abnormalities of the teeth are in detail as follows :

In male skull 255.121, Arkansas, both upper third molars are, as indicated by the alveoli, small in size.

In male skulls 255.123, 255.145, and 255.150, Arkansas, the upper front teeth show slight crowding.

In male skull 255.149, Arkansas, the right upper third molar is small.

In female skull 255.129, Arkansas, the right upper second bicuspid has a tri-lobe root.

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In female skull 255.130, Arkansas, both upper third molars are of sub-medium dimensions.

In male skull 255.107, Louisiana, the upper third molars are sub-medium in size.

In male skull 255.115, Louisiana, there is a moderate crowding of the upper front teeth.

In male skull 255.210, Louisiana, the right lower third molar points forward and upward, while the left upper third molar is of sub-medium size.

In female skull 255.116, Louisiana, the right upper third molar is diminutive.

In female skull 255.202, Louisiana, the upper third molars are sub-medium in size.

In female skull 255.216, Louisiana, there is a supernumerary tooth between the right upper lateral incisor and canine; it is smaller than the incisor, but much like it in form.

Diseased Teeth.—Decayed teeth, while not very common or numerous, are nevertheless quite frequent in the Louisiana crania, and in even a greater degree the same is true of teeth lost during life, doubtless due to caries in the great majority of cases. The conditions in this respect, so far as could be ascertained, are as follows:

	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
Skulls with no teeth decayed or lost during life	7	1	5	3
Skulls with one or more teeth decayed or lost during life	6	7	11	15

It was not possible in all cases to determine the sequence of the decay; it is nevertheless plain that among the people of both Louisiana and Arkansas, the first teeth affected by caries, both in frequency and time, were the molars, then the bicuspid, lastly the more anterior teeth. Regarding the latter, only one case of caries was observed in the canines, and the incisors that remain are all healthy, but in many instances the loss of one or more of these teeth makes the observation incomplete.

V.

MEASUREMENTS AND DESCRIPTION OF THE BONES.

Bones other than Skulls.

The measurements and observations concerning the Arkansas and Louisiana bones will be most conveniently presented together, as are the descriptive notes on the crania of the two series. Like the skulls, they present many similarities. There are slight differences here and there, but on the whole the data regarding both the

long and the other bones serve to strengthen the conclusion that we are dealing with two groups of the same people, or rather of the same mixture of people.

The separation of the bones pertaining to individuals respectively with rounded and with oblong skulls would have been desirable, but, for reasons already given, this has not been feasible.

On the whole the specimens show all the characteristics exhibited by Indian bones, though some of these characteristics, such as platycnemy, are less pronounced or are less general than in the case of bones from other localities.

Many of the bones are diseased; these are dealt with in the final section of the report. Arthritic conditions are common, and inflammatory lesions, which in all probability can be ascribed to syphilis, also are frequent.

As to anomalies, those of an important nature rarely occur in the Arkansas series. The fifth lumbar vertebra of male skeleton 255.127 shows a defect in fusion of the laminae. And the right patella of male skeleton 255.141 is characterized by an unusually pronounced vastus externus notch (Fig. 9 d).

Among the Louisiana bones the left female humerus 255.108 shows a peculiar irregular exostosis back of the lower third of the deltoid ridge (Fig. 5, e). Right tibia of male skeleton 255.100 shows a pronounced popliteal ridge 16.0 cm. long. The right innominate bone of male skeleton 255.210, and the right and left innominate bones of female skeleton 255.105, have the medio-iliac foramen. The sacrum of 255.217, male, shows a considerable enlargement of the right transverse mass of its first segment and a large irregular facet thereon, by which it articulates with the enlarged lateral process of the last lumbar vertebra (Fig. 8). The seventh cervical vertebra of male 255.215 shows a foramen 5 by 2.5 mm. (defect of fusion in its spinous process), slightly distad from the middle (Fig. 9 a).

The first dorsal of 255.212, female, shows a peculiar lateral process on the left side, appearing like an anchylosed accessory rib, though both regular costal articular facets are present (Fig. 9 b). Finally, the fourth lumbar of 255.219, female, shows a separation of the posterior part of its neural arch, and its articulation with the pedicles by a very irregular facet on each side; both the third and fifth lumbar being normal (Fig. 9 c).

The Humerus.

The total number of paired humeri is 92, representing 28 males and 18 females. Their average length ranges in the males from 32.6 to 32.7 cm., and in the females from 29.8 to 32.0 cm., almost exactly the averages obtained by the writer from observations on 378 male and 133 female white Americans from eastern United States.¹ The relation between the female and male arm-bones is approximately as 92 to 100, which also is equal to that in whites. This length of humerus would correspond, according to Manouvrier's standards, to a stature average of about 166 cm. in males and about 154 cm. in females. This point will be dealt with again under *Femur* (page 215).

¹ This and additional material which will be here referred to is in preparation for special publication.

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The dimensions of the shaft at the middle show an average lateral diameter¹ very nearly as large as in the whites; but the average antero-posterior diameter² is decidedly smaller. This is best shown in the percental relation of these two diameters, or index of the shaft at middle. This in the writer's series of 304 white American males averages on the right 81.6, and on the left 83.9; and in 97 American females, on the right 78.8, and on the left 79.6. In the Indians under consideration, the same index averages 74.4 (Arkansas) and 76.8 (Louisiana) on the right, and 75.4 (Arkansas) and 77.8 (Louisiana) on the left in the males; while in the females it is 69.8 (Arkansas) and 73.1 (Louisiana) on the right, with 73.1 (Arkansas) and 73.9 (Louisiana) on the left. These proportions show that the humeri of the Arkansas and Louisiana Indians are both weaker and flatter than those of the average white Americans. In both the white and the Indian, and in both sexes, the left humerus shows a higher index of the shaft than the right bone; this is due to the fact that its lateral diameter is smaller, as compared with that of the right humerus, while the difference is less in its antero-posterior dimension on the two sides.

HUMERUS—LENGTH: DIMENSIONS AND INDEX AT MIDDLE.							RADIUS—LENGTH: RADIO-HUMERAL INDEX						
Sex and Locality	Side	Number of specimens	Average length (maximum)	Number of specimens	Average diameter lateral at middle	Number of specimens	Average diameter antero-posterior at middle	Number of specimens	Average index of shaft at middle	Number of specimens	Average length (maximum) of radius	Number of specimens	Average radio-humeral index
Males			cm.		cm.		cm.		cm.		cm.		
Arkansas: Boytt's Field	Right	9*	32.7 (29.5-34.2)	10	2.3 (2.0-2.6)	10	1.70 (1.55-1.85)	10	74.4 (69.4-83.7)	3	25.0 (24.4-25.7)	3	75.6 (75.3-77.9)
	Left	9	32.6 (29.4-34.2)	10	2.2 (1.95-2.35)	10	1.67 (1.5-1.8)	10	75.4 (72.7-80.9)	3	24.7 (24.1-25.5)	3	75.0 (74.2-79.0)
Louisiana	Right	19	32.7 (30.6-35.2)	18	2.3 (1.85-2.7)	18	1.76 (1.35-1.95)	18	76.8 (64.6-90.7)	10	25.3 (24.1-26.5)	9	77.8 (74.6-80.1)
	Left	19	32.7 (30.2-35.8)	18	2.2 (1.85-2.7)	18	1.74 (1.35-2.05)	18	77.8 (68.1-89.1)	10	25.1 (22.9-26.5)	9	77.6 (72.9-80.5)
Females													
Arkansas: Boytt's Field	Right	2	28.9 (27.6-30.2)	5	2.05 (1.8-2.2)	5	1.4 (1.3-1.6)	5	69.8 (66.7-72.7)	—	—	—	—
	Left	2	28.9 (28.0-29.9)	5	2.0 (1.75-2.2)	5	1.4 (1.15-1.6)	5	70.3 (65.0-80.0)	—	—	—	—
Louisiana	Right	13	30.2 (28.3-32.0)	13	2.05 (1.8-2.2)	13	1.5 (1.35-1.6)	13	73.1 (67.5-80.6)	14	22.7 (21.9-23.7)	6	76.2 (74.2-78.6)
	Left	13	29.8 (28.1-32.0)	13	2.0 (1.9-2.2)	13	1.5 (1.3-1.6)	13	73.9 (63.4-84.2)	14	22.6 (21.6-24.1)	6	77.4 (75.2-80.6)

* Applies to pairs only.

¹ Parallel with the anterior surface of the bone.

² At right angles to its anterior surface.

The shape of the shaft in cross-section at middle approaches, for the greater part (as will be seen from the details given below), the prismatic, or a prismatic with a broadening of the anterior border into a fourth surface. There is also a fair percentage of plano-convex humeri which represent the juvenile form.

HUMERUS—SHAPE OF SHAFT AT MIDDLE (<i>a</i>).								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	11	11	5	6	21	21	19	18
Types:								
1 or near 1 (<i>b</i>)	3	4	3	1	9	9	17	12
2 or near 2 (<i>c</i>)	0	0	0	0	1	2	0	2
4 or near 4 (<i>d</i>)	5	4	1	1	4	9	1	3
p. c. or near p. c. (<i>e</i>)	3	3	1	4	7	1	1	1

a See, in this regard, as well as in connection with the same item under other headings, Hrdlička, A., Typical Forms of Shaft of Long Bones, Proc. Ass. Amer. Anat., 14th Sess., 1900, p. 55 *et seq.*

b Ordinary prismatic.

c Lateral prismatic.

d Anterior border at and below middle is broadened into a fourth surface.

e Plano-convex.

The torsion was found, barring a few individual exceptions, to be moderate.

The deltoid eminence, while generally well marked, is pronounced only in the humeri of one skeleton, namely, female 255.130, Arkansas.

None of the humeri examined bears more than a trace of the supra-condyloid process.

The articular extremities show the usual sex differences.

The septum between the coronoid and the olecranon fossæ is defective in a large proportion of these humeri. These defects appear to be more common in the Arkansas series than in that from Louisiana, and, as usual, they are decidedly more frequent in the females than in the males. As to the sides, there is in these series a slight preponderance of the defects on the right, which is contrary to the rule, and is probably accidental. As in other cases the perforation is often found on both sides of the body. The relatively great frequency of these defects, which are formed principally during childhood, by physiological absorption of the bone composing the septum, will be noted from the fact that, among 2371 humeri of whites of both sexes, examined by the writer, such defects existed only in 99, or 4.2 per cent. In the following table are presented the details in regard to this peculiarity in the humeri under consideration.

HUMERUS—DEFECTS OF THE SEPTUM								
Defects	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Total number of specimens examined	11	12	4	6	18	23	20	17
Defects: pin-point	—	1	—	—	2	—	—	—
small	3	2	1	—	—	2	—	4
medium	—	3	2	3	—	3	7	6
large	2	1	—	1	1	1	1	2
special	—	—	—	—	—	1 (a)	—	—
Total defects	5	7	3	4	3	7	8	12
Percentage of bones with defects	45%	58%	75%	67%	16.5%	30%	40%	71%
Percentage of bones with defects according to locality	Arkansas, 58%				Louisiana, 38.5%			
Percentage of bones with defects according to sex	Males, 34.5%				Females, 57.5%			
Percentage of bones with defects according to side	Right, 57.5%				Left, 41.2%			

(a) Shows two perforations.

The Radius.

As with the humerus, the dimensions of the radius are quite similar in the Arkansas and Louisiana skeletons; and, as in whites, the bone averages slightly longer on the right side. In strength and curvature the radii of both groups are generally moderate.

The principal interest of the radius lies in the comparison of its length with that of the humerus, or in the so-called radio-humeral index. This proportion is decidedly greater in Indians than in whites, showing that the Indian forearm is relatively longer, a feature common to the less advanced races. The examination of the bones of 526 white males and 212 white females gave the writer an average radio-humeral index of 73.6 for the former and 72.8 for the latter. In the Indians, as is seen in the above table, the index averages approximately 75.3 for the Arkansas and 77.7 for the Louisiana males, with 76.8 for the Louisiana females. Both in whites and in Indian males it is slightly higher on the right than on the left; the small group of female skeletons from Louisiana form an exception.

The Ulna.

The average dimensions of the ulna are given in a table in the section on *Fibulæ* (page 220). There are only 39 ulnæ in condition to permit measurement.

The bones of the right side exceed perceptibly in length those of the left side, in both the males and the females. The curvature is usually fairly well marked. The pronator quadratus ridge is generally well developed, and occasionally, as in female ulna 255.219, Louisiana, is pronounced. The shape of the shafts of the ulnæ is given in the next table. The shafts, it is seen, are chiefly prismatic; but there are also numerous cases in which there are four instead of three distinct surfaces, due to duplication of the posterior plane, and many instances in which one or more of the surfaces are pronouncedly concave.

ULNA—SHAPE OF SHAFTS AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	6	9	2	1	16	14	19	17
Types:								
1 (<i>a</i>)	4	4	1	1	4	4	7	9
3 (<i>b</i>)	2	2	—	—	2	5	3	1
3 <i>a</i> (<i>c</i>)	—	—	—	—	—	—	2	2
3 <i>b</i> (<i>d</i>)	—	2	1	—	1	—	1	1
4 (<i>e</i>)	—	1	—	—	7	4	6	3
Unclassified	—	—	—	—	2	1	—	1

a Prismatic or near prismatic.

b Flexor surface concave.

d Both flexor and extensor surfaces concave.

c Extensor surface concave.

e Four surfaces well defined.

The Femur.

The length of the femur in the Arkansas and Louisiana groups shows slight differences, but as these are unequal in the two sexes, they are probably without significance. The length of the female femur is to that of the male approximately as 92 to 100, the same relation as with the humeri. In most of the subdivisions the left bone is of very slightly greater average length than the right, a phenomenon observed also in whites and in other races.

Additional measurements of the femur pertain to the sub-trochanteric flattening, which in the whites has been studied principally by Manouvrier.¹ Of this

¹ Manouvrier, L., *La Platymérie*. 46. The same, *La Platymérie*. C.-R. du Congr. intern. d'Anthrop., Paris, 1889. 47. The same, *La Platymérie*. Rev. mens. de l'École d'Anthrop. de Paris, 1892. 51. The same, *Étude sur les variations morphologiques du corps du fémur dans l'espèce humaine*. Bull. de la Soc. d'Anthrop. de Paris, 1893.

See also, for additional bibliography and observations: Klaatsch, H., *Die Wichtigsten Variationen am Skelet der Freien Unteren Extremität des Menschen und ihre Bedeutung für das Abstammungsproblem*. Ergebnisse der Anatomie und Entwicklungsgeschichte, X, Wiesbaden, 1900, p. 599, *et seq.*

flattening, which is more pronounced in Indians than in whites, two measurements were taken, namely, the greatest lateral and the smallest antero-posterior diameter. The percental relation of these dimensions gives the index of the flattening. This index, it is seen, is lower in the females than in the males, showing that the female femur is the flatter at this point. As to the two sides, it differs but little. In the two areas under consideration, the index of flattening is perceptibly higher in the femora of the Arkansas males than in those of Louisiana. The female groups show an opposite condition, but this may be due to the small number of specimens obtained.

FEMUR—LENGTH: MEASUREMENTS AND INDEX OF SUBTROCHANTERIC FLATTENING									
Sex and Locality	Side	Number of specimens	Average bicondylar length of femur	Number of specimens	Average minimum breadth at subtrochanteric flattening (a)	Number of specimens	Average minimum thickness at subtrochanteric flattening (b)	Number of specimens	Index of platymery $\left(\frac{b \times 100}{a}\right)$
Males			cm.		cm.		cm.		
Arkansas: Boytt's Field	Right	14	45.6 (42.0-48.8)	15	3.2 (2.75-3.65)	15	2.5 (2.15-2.75)	15	76.7 (70.4-84.6)
	Left	14	45.6 (42.1-48.7)	15	3.2 (2.8-3.5)	15	2.5 (2.2-2.75)	15	76.6 (72.1-80.8)
Louisiana	Right	19	44.1 (39.9-48.3)	23	3.3 (3.0-3.6)	23	2.4 (2.0-2.7)	23	74.2 (65.6-86.7)
	Left	19	44.2 (39.8-48.4)	23	3.3 (2.9-3.6)	23	2.4 (2.0-2.7)	23	74.6 (64.7-83.3)
Females									
Arkansas: Boytt's Field	Right	4	41.0 (38.9-42.4)	6	3.2 (3.15-3.35)	7	2.2 (1.75-2.45)	6	69.5 (54.7-75.4)
	Left	4	41.2 (39.2-42.8)	6	3.2 (3.05-3.3)	7	2.2 (1.70-2.45)	6	70.2 (53.1-78.7)
Louisiana	Right	12	41.25 (38.8-43.1)	13	3.05 (2.8-3.3)	13	2.2 (2.05-2.4)	13	72.9 (62.1-81.1)
	Left	12	41.3 (38.4-43.3)	13	3.05 (2.85-3.3)	13	2.2 (2.0-2.35)	13	72.2 (63.5-81.0)

The relation between the length of the humerus and the length of the femur, or humero-femoral index, approaches 72 in this series, or nearly the same as is observed in whites.

The shaft is massive and generally well developed.

The linea aspera, as will be seen by the following notes, is in numerous cases exceptionally high, giving the so-called pilasteric character to the shaft; but this feature is plainly a compensatory one, for a more than ordinarily greater backward bending of the shaft, about or above its middle, is present in these bones.

The shape of the shaft predominantly approaches the prismatic, but pure types of this form are rare. Next in frequency is the elliptical shape, followed by the plano-convex. It is interesting to note that the plano-convex shaft is found only in the males. A somewhat similar condition prevails in the case of the round shaft, while, on the other hand, the elliptical form is much more frequent in the female femora.

FEMUR—LINEA ASPERA								
Condition of Linea Aspera	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	16	17	7	6	28	23	16	18
Medium	5	5	7	6	13	17	13	14
High	7	9	—	—	11	3	3	4
Very high	4	3	—	—	4	3	—	—

FEMUR—SHAPE OF SHAFT AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	14	16	7	6	25	21	17	17
Types:*								
<i>l</i> or near <i>l</i>	8	9	4	2	14	12	10	8
<i>e</i> or near <i>e</i>	—	1	1	2	3	3	6	8
<i>r</i> or near <i>r</i>	1	1	—	1	5	2	—	—
<i>4</i> or near <i>4</i>	—	—	2	1	1	2	1	1
<i>p. c.</i> (6) or near	5	5	—	—	2	2	—	—

* *l* Ordinary prismatic.

e Elliptical.

r Round.

4 Anterior surface divided by a vertical ridge into two surfaces.

p. c. (or 6) plano convex.

As will be seen in the next table, gluteal tuberosities, or third trochanters, are fairly numerous, particularly in the bones from Louisiana. This process is also slightly more frequent in this series among the females than among the males. The oblong form is decidedly more numerous than the rounded one.

Individual specimens that deserve separate notice, in addition to those mentioned in Section VI, are as follows:

Male femora 255.121, 255.128, 255.141, Arkansas: Angle of neck of these specimens on both sides is very obtuse.

Right male femur 255.124, Arkansas: Exceptional grade of torsion.

Female femur 255.130, Arkansas: The shaft shows on the antero-external surface, upper third, a smooth, bony elevation, 2.3 cm. long, 0.4 cm. high, and 1.4 cm. broad.

Right male femur 255.205, Louisiana: Torsion pronounced; left bone?

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Female femora 255.105a, Louisiana: Both show marked torsion.

Female right femur 255.112, Louisiana: The gluteal tuberosity is 4.0 cm. long and 1.0 cm. high.

FEMORA—THIRD TROCHANTER, OR GLUTEAL TUBEROSITY								
Variety of Third Trochanter	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	13	15	7	6	27	21	17	19
Small rounded	—	1*	—	1	1	2	—	—
Small oblong	2	—	4	2	6	6	5	5
Medium rounded	1	—	—	—	1	—	2	1
Medium oblong	1	1	—	1	4	4	1	4
Pronounced rounded	—	—	—	—	—	—	—	1
Pronounced oblong	—	1	—	—	2	1	4	1
Absent	9	12	3	2	13	8	5	7
Percentage of bones with third trochanter, all grades and variations	31%	20%	57%	67%	52%	62%	71%	63%
Percentage of bones with third trochanter, according to locality	Arkansas, 36.5%				Louisiana, 61%			
Percentage of bones with third trochanter, according to sex	Males, 55%				Females, 65%			

* Three moderately rounded tubercles.

The Tibia.

The length of the tibiae, like that of the femora, averages slightly greater in the male skeletons from Arkansas than in those from Louisiana; as to the females, the bones from Arkansas are too few in number to be of value for comparison. The right tibia averages slightly longer than the left. The relation of the length of the tibia to that of the femur, *i. e.*, the tibio-femoral index, which ranges in whites from about 80 to 81, is perceptibly greater in the skeletons under consideration, especially those from Louisiana. It is a curious local peculiarity that this index, in both males and females, is somewhat higher in Louisiana than in Arkansas. The sexual differences, as in whites, are quite immaterial; and nothing definite appears from the series as to differences on the two sides of the body.

In addition to its length, the tibia was measured also as to its two principal

diameters at the middle of the shaft. These diameters,¹ as determined by the writer in nearly 2000 normal adult bones of whites,² produce for the antero-posterior dimension in the males an average of 3.13 cm. on the right, and 3.14 on the left; while in the females it is 2.72 cm. on the right and 2.57 c. m. on the left.

TIBIA—LENGTH; DIMENSIONS AND INDEX AT MIDDLE; TIBIO-FEMORAL INDEX											
Sex and Locality	Side	Number of specimens	Average length (greatest length less spine)	Number of specimens	Average diameter antero-posterior at middle	Number of specimens	Average diameter lateral at middle	Number of specimens	Average index of shaft at middle	Number of specimens	Average tibio-femoral index
Males			cm.		cm.		cm.				
Arkansas : Boytt's Field	Right	7	38.5 (36.4-41.6)	9	3.45 (3.2-3.85)	9	2.2 (1.95-2.45)	8	63.7 (51.9-81.7)	5	82.1 (79.8-85.2)
	Left	7	38.3 (35.9-41.6)	9	3.5 (2.85-3.8)	9	2.2 (2.0-2.35)	8	63.6 (52.6-82.3)	5	82.6 (79.0-85.4)
Louisiana	Right	13	37.10 (34.4-40.3)	17	3.3 (2.8-3.7)	17	2.2 (1.9-2.6)	17	68.45 (58.6-78.6)	9	84.2 (79.8-88.6)
	Left	13	37.08 (34.5-40.3)	17	3.3 (2.9-3.7)	17	2.2 (1.85-2.6)	17	68.5 (56.8-79.3)	9	84.3 (81.1-86.6)
Females											
Arkansas : Boytt's Field	Right	2	33.15 (33.1-33.2)	4	2.8 (2.75-2.9)	4	1.95 (1.85-2.05)	4	68.7 (63.8-73.2)	2	82.7 (80.1-85.4)
	Left	2	33.15 (32.7-33.4)	4	2.8 (2.7-2.95)	4	2.0 (1.8-2.3)	4	69.8 (66.1-78.0)	2	82.0 (80.5-83.7)
Louisiana	Right	10	34.8 (32.2-37.8)	9	2.9 (2.6-3.05)	9	1.9 (1.65-2.05)	9	64.5 (55.0-70.2)	6	84.3 (81.9-88.2)
	Left	10	34.7 (32.3-37.6)	9	2.9 (2.65-3.1)	9	1.85 (1.55-2.05)	9	63.9 (55.3-71.7)	6	83.5 (80.8-86.5)

The lateral diameter of the tibia averages in white males, on the right side 2.24 cm., on the left 2.20 cm.; in the females, on the right 2.05 cm., and on the left 1.86 cm. This dimension gives a breadth-height index of the shaft of the tibia of 71.1 in the white males and 71.9 in the white females. In the Indians the antero-posterior diameter in all the series is somewhat superior to that in whites, while the lateral dimension averages equal or smaller. This gives rise to a smaller index of the shaft, expressing greater platycnemy in the Indian. Comparisons as to locality, sex, and side, in the two Indian series, are not satisfactory, due to the small and irregular number of specimens.

As to the shape of the shaft of the tibia, the ordinary prismatic is found to prevail, but lateral prismatic shafts are also quite numerous. A large proportion of the tibiae, however, show a shaft characterized by pronounced concavity of the external surface in the region of the tibialis anticus muscle, while numerous others

¹ The antero-posterior diameter is the maximum measurement, the lateral diameter being that at a right angle to the antero posterior axis of the bone. The latter is taken in such a way that the anterior border of the tibia lies on the rod of the sliding compass in the middle of its opening.

² See "Study of the Normal Tibia," The American Anthropologist, October, 1898, p. 307 *et seq.*; also Proc. Assoc. Amer. Anatomists, 11th Annual Session, New York, 1898.

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are of type 4, which distinctly shows four instead of three surfaces, the additional plane resulting from a duplication of the posterior surface by a ridge which follows the line of the septum between the flexor longus digitorum and the tibialis posticus muscles.

TIBIA—SHAPE OF SHAFT AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	14	13	4	6	20	22	12	12
Types: 1 or near 1 (<i>a</i>)	2	4	2	4	5	9	5	4
2 or near 2	1	1	2	2	4	3	1	3
3 or near 3	3	3	—	—	6	4	2	1
4 or near 4	7	4	—	—	5	6	2	3
5 or near 5	1	—	—	—	—	—	2	1
6 or near 6	—	1 (<i>b</i>)	—	—	—	—	—	—

- (*a*) 1 Ordinary prismatic.
 2 Lateral prismatic.
 3 External surface markedly concave.
 4 Posterior surface divided into two distinct surfaces by a vertical ridge.
 5 Posterior surface concave, external border indistinct.
 6 Lateral prismatic, with postero-lateral and antero-lateral surfaces markedly convex and anterior border very dull.
 (*b*) Specimen 255.138*a* was partly fused with tibia, which may account for this exceptional shape in an Indian.

The inclination of the head of the tibia was, in no case, very pronounced.

The Fibula.

The proportion of fibulae available for measurement is rather small, though fragments are numerous. The measurements of length show practically equal averages for the bones of the two sides.

The shape approaches most frequently the ordinary or the lateral prismatic. In female skeleton 255.097, Louisiana, both the fibulae are unusually flat.

The Clavicle.

The collection contains 31 clavicles that can be measured. These bones show nearly the same dimensions in the two areas from which the material was gathered. They also show that the left clavicle is on the average somewhat longer than the right. A similar condition exists, as we know from the studies of Pasteau¹ and others, in whites and in other races.

¹ Pasteau, E. Recherches sur les proportions de la clavicule dans les sexes et dans les races. Thèse. Paris, 1879.

The curves of the clavicle are moderate in all but two cases (male 255.123 and male 255.127, Arkansas), in which they are very marked.

None of the bones is massive.

Rhomboid impression or facet is present in slight to moderate form in all, and is pronounced in male 255.123, Arkansas.

Female clavicle 255.095, Louisiana, shows a very prominent conoid tubercle.

ULNA; FIBULA; CLAVICLE—LENGTH							
Sex and Locality	Side	Number of specimens	Average length (maximum) of the ulna	Number of specimens	Average length (maximum) of the fibula	Number of specimens	Average length (maximum) of the clavicle
Males			cm.		cm.		cm.
Arkansas: Boytt's Field	Right	5	27.3 (25.4–29.3)	3	36.2 (35.6–36.6)	4	15.1 (13.2–16.4)
	Left	—	.....	—	.....	4	15.7 (14.0–17.1)
Louisiana	Right	7	26.9 (25.9–28.1)	4	36.75 (35.3–39.2)	7	15.2 (13.6–16.1)
	Left	7	26.6 (25.1–27.8)	4	36.7 (35.3–39.1)	7	15.5 (14.1–16.3)
Females							
Arkansas: Boytt's Field	Right	2	24.1 (23.8–24.5)	—	.....	1	14.0
	Left	—	.....	2	32.4 (32.0–32.8)	—	.....
Louisiana	Right	9	24.4 (23.8–25.4)	4	34.7 (34.2–36.3)	4	13.5 (12.9–14.1)
	Left	9	24.3 (23.4–25.3)	4	34.7 (34.0–36.3)	4	13.7 (13.1–14.5)

FIBULA—SHAPE OF SHAFT AT MIDDLE								
Types of Shape	ARKANSAS				LOUISIANA			
	Males		Females		Males		Females	
	Right	Left	Right	Left	Right	Left	Right	Left
Number of specimens examined	2	4	—	1	16	11	6	5
Types: 1 (<i>a</i>)	1	2	—	1	5	1	—	1
2 or 2 <i>a</i> (<i>b</i>)	—	—	—	—	5	8	3	2
3 or 3 <i>a</i> (<i>c</i>)	—	1	—	—	3	2	1	—
3 <i>b</i> (<i>d</i>)	1	—	—	—	—	—	1	1
4 (<i>e</i>)	—	1	—	—	3	—	1	1

a Ordinary quadrilateral, approaching prismatic.
b Approaching lateral prismatic.
c External or internal surface concave.
d Both external and internal surfaces concave.
e Five distinct surfaces (formation by a vertical ridge of two planes from the external surface).

The Sternum.

From Arkansas there are two bodies and four manubria, and from Louisiana four bodies and seven manubria. In none of these cases is the manubrium attached to the body. The bodies vary considerably in all dimensions.

The Scapula.

Of the scapulæ there are but few fragments, and three imperfect pieces that could be measured. All of these are from Louisiana. In descriptive features they exhibit nothing of special interest.

MEASUREMENTS							
Sex	Number	Side	Height : inferior to superior angle	Height: inferior angle to inter- section of spine and median border	Breadth (Broca)	Breadth-height index total	Breadth-height index inferior
Male	255.201	Right	cm. 16.0	cm. 11.7	cm. 10.5	65.6	89.7
Male	.106	Left	?	11.0	10.7	?	97.3
Female	.095	Left	13.5	11.0	?	?	?

The Vertebrae.

The dimensions of the vertebrae are generally moderate, the bones being never very large or massive. The principal anatomical features are similar to those in whites. As to variations in number, little can be determined on account of the incompleteness of the sets.

The principal anomalies of the vertebrae are mentioned at the beginning of this section.

A peculiar feature is the very frequent occurrence of more or less marked lateral asymmetry of the bodies of the dorsal vertebrae, without indication of disease.

The Pelvis.

There are in all 14 pelves, 4 male and 10 female, on which measurements are possible. Owing to the small number of specimens in the individual groups, the data are not useful for comparison, and must remain simply as so many records to be utilized with additional material in the future.

The general index of the pelvis averages higher in the male skeletons from the two sections, as well as in the female skeletons from Louisiana, than it does in the whites, thus showing relatively great breadth. The average index of the inlet, which in whites ranges from 79 to 80, is likewise greater in most of the Indian skeletons.

In addition to the pelves, there are present a number of single ossa innominata, the measurements of which are given in the table (p. 223). The figures give some interesting indications, but the number of specimens is too small for definite deductions.

PELVIS—DIMENSIONS AND INDICES								
Sex and Locality	Number of specimens	Average maximum height (a)	Average maximum breadth (b)	Average index of pelvis $\left(\frac{a \times 100}{b}\right)$	Number of specimens	Average greatest breadth of the inlet	Average depth (diameter antero posterior) of the inlet	Average index of the inlet
Males		cm.	cm.			cm.	cm.	
Arkansas : Boytt's Field	1	20.2	27.0	134	1	11.8	.....	.....
Louisiana	6	$\frac{21.3}{(20.8-22.2)}$	$\frac{27.9}{(26.3-29.6)}$	$\frac{130.6}{(119.5-135.8)}$	6	$\frac{12.1}{(11.4-13.3)}$	$\frac{11.0}{(9.7-12.6)}$	$\frac{91.6}{(75.2-107.0)}$
Females								
Arkansas : Boytt's Field	2	$\frac{20.6}{(20.2-21.0)}$	$\frac{26.7}{(26.2-27.2)}$	$\frac{129.6}{(129.5-129.7)}$	3	$\frac{13.0}{(12.4-13.8)}$	$\frac{10.9}{(10.3-12.1)}$	$\frac{84.1}{(81.2-87.7)}$
Louisiana	4	$\frac{19.5}{(18.2-20.3)}$	$\frac{27.6}{(26.7-28.6)}$	$\frac{141.4}{(136-152.7)}$	3	$\frac{13.5}{(12.9-14.3)}$	$\frac{10.4}{(9.2-11.5)}$	$\frac{77.5}{(69.7-89.1)}$

The Sacrum.

The total number of sacra that could be measured is 13, but some additional specimens are available for observation. The indices are all lower than in the whites, showing that the sacrum is relatively high, as in the negro.

OSSA INNOMINATA; SACRUM—AVERAGE MEASUREMENTS AND INDICES												
OSSA INNOMINATA								SACRUM				
Sex and Locality	Side	Number of specimens	Average height (maximum) (a)	Number of specimens	Average breadth (between superior iliac spines) (b)	Number of specimens	Average breadth-height index $\left(\frac{b \times 100}{a}\right)$	Sex and Locality	Number of specimens	Average height (in middle) (a)	Average breadth (maximum) (b)	Average index $\left(\frac{b \times 100}{a}\right)$
Males			cm.		cm.			Males		cm.	cm.	
Arkansas : Boytt's Field	Right	2	$\frac{20.0}{(19.8-20.2)}$	—	.....	—	.....	Arkansas : Boytt's Field	2	$\frac{11.55}{(11.0-12.1)}$	$\frac{11.7}{(11.5-11.9)}$	$\frac{101.6}{(95.0-108.2)}$
	Left	2	$\frac{19.9}{(19.8-20.0)}$	--	.....	—	.....					
Louisiana	Right	2	$\frac{22.05}{(22.0-22.1)}$	2	$\frac{16.05}{(15.4-16.7)}$	2	$\frac{72.8}{(70.0-75.6)}$	Louisiana	4	$\frac{11.8}{(11.4-12.4)}$	$\frac{11.7}{(10.7-12.5)}$	$\frac{99.1}{(93.9-107.0)}$
	Left	2	$\frac{22.15}{(22.1-22.2)}$	2	$\frac{15.85}{(15.3-16.4)}$	2	$\frac{71.6}{(69.2-73.9)}$					
Females								Females				
Arkansas : Boytt's Field	Right	2	$\frac{20.6}{(20.2-21.0)}$	1	15.4	1	73.3	Arkansas : Boytt's Field	1	12.1	12.8	105.8
	Left	2	$\frac{20.6}{(20.2-21.0)}$	1	15.7	1	74.8					
Louisiana	Right	2	$\frac{20.1}{(20.1-20.1)}$	2	$\frac{15.0}{(14.8-15.2)}$	2	$\frac{74.6}{(73.6-75.6)}$	Louisiana	6	$\frac{11.1}{(9.6-12.3)}$	$\frac{11.8}{(11.1-12.4)}$	$\frac{106.9}{(100.8-115.6)}$
	Left	2	$\frac{20.1}{(19.9-20.3)}$	2	$\frac{15.45}{(15.3-15.6)}$	2	$\frac{76.9}{(75.4-78.4)}$					

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As to the number of segments composing the sacrum, it is found that in three-fourths of the cases the bone has five, and in the remainder of the specimens, six. In addition there is a tendency in one case (Fig. 8) to assimilation of the last lumbar.

Of the extra segments one is lumbar and four are coccygeal.

The curvature is more often accentuated in the females than in the males, as in whites. As will be seen from the details presented in the next table, it also begins high more frequently in the females than in the males.

The neural canal is defective for the greater part from the fourth, or from below the fourth, spinous process downward. This also is most frequently the case in whites.

SACRUM—CHARACTERISTICS				
	ARKANSAS		LOUISIANA	
	Males	Females	Males	Females
<i>Segments : 5</i>	3	—	6 (1 tending to assimilation of last lumbar)	5
6	—	1	2	2
<i>Extra segment is</i>	—	1 coccygeal	1 lumbar 1 coccygeal	2 coccygeal
<i>Curvature :</i>				
small	—	—	2	—
moderate	3	—	5	2
good	—	2	2	5
<i>Curvature begins with</i>				
first segment	—	1	3	5
second segment	3	1	3	2
third segment	—	—	1	—
fourth segment	—	—	1	—
<i>Neural canal exposed from</i>				
below third spinous process	—	1	2	—
at fourth	—	—	1	4
below fourth	3	—	3	2
at fifth	—	—	1	1
below fifth	—	1	—	—

The Patellæ.

The patellæ of the Arkansas and Louisiana skeletons are, as will be noted in the measurements given below, generally of moderate dimensions, with an average breadth slightly exceeding the height. There is very little difference in the bones from the two localities. The patella in the female is smaller in all proportions than that in the male; the breadth-height index is quite similar. The right and left bones differ but slightly.

PATELLA—AVERAGE DIMENSIONS AND BREADTH-HEIGHT INDEX								
Proportions	ARKANSAS							
	MALES				FEMALES			
	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left
Breadth (maximum), cm.	6	$\frac{4.35}{(4.15-4.7)}$	5	$\frac{4.2}{(4.0-4.65)}$	3	$\frac{3.8}{(3.6-4.15)}$	—	—
Height (maximum), cm.	6	$\frac{4.25}{(4.05-4.5)}$	5	$\frac{4.3}{(3.9-4.65)}$	3	$\frac{3.8}{(3.6-3.95)}$	—	—
Thickness (maximum), cm.	6	$\frac{2.0}{(1.7-2.2)}$	5	$\frac{1.9}{(1.8-2.15)}$	3	$\frac{1.8}{(1.7-1.85)}$	—	—
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	6	$\frac{102.5}{(92.1-105.8)}$	5	$\frac{98.1}{(95.4-100.0)}$	3	$\frac{100.6}{(91.1-109.2)}$	—	—
Proportions	LOUISIANA							
	MALES				FEMALES			
	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left
Breadth (maximum), cm.	5	$\frac{4.35}{(4.15-4.6)}$	5	$\frac{4.4}{(4.1-4.65)}$	4	$\frac{3.9}{(3.75-4.1)}$	4	$\frac{3.9}{(3.75-4.0)}$
Height (maximum), cm.	5	$\frac{4.3}{(3.9-4.85)}$	5	$\frac{4.2}{(3.95-4.75)}$	4	$\frac{3.8}{(3.7-3.85)}$	4	$\frac{3.8}{(3.8-3.85)}$
Thickness (maximum), cm.	5	$\frac{2.0}{(1.9-2.1)}$	5	$\frac{2.0}{(1.9-2.1)}$	4	$\frac{1.8}{(1.75-1.85)}$	4	$\frac{1.8}{(1.75-1.9)}$
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	5	$\frac{101.1}{(85.6-112.8)}$	5	$\frac{104.2}{(91.6-113.4)}$	4	$\frac{103.6}{(100-110.8)}$	4	$\frac{102.3}{(97.4-105.3)}$

An interesting feature in regard to the patella is the occasional presence of the vastus externus notch, *i. e.*, a more or less marked defect in the border of the bone in the locality of the vastus externus insertion. This notch, which is seen rather frequently in Egyptian bones, and is also met occasionally among the whites, is present in more than half the male specimens and in more than a third of the patellæ of females. It is, however, seldom pronounced, the majority of the bones showing only traces of the feature.

The patellæ of male skeletons 255.111 and 255.222, Louisiana, show each an extraordinarily developed apex.

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PATELLA—THE VASTUS EXTERNUS NOTCH												
	ARKANSAS				LOUISIANA				TOTALS			
	Males		Females		Males		Females		Arkansas	Louisiana	Males	Females
	Right	Left	Right	Left	Right	Left	Right	Left				
Number of specimens examined	7	6	3	—	8	10	8	7	16	33	31	18
Notch absent	4	3	1	—	2	5	6	6	50%	58%	45%	72%
Trace	1	2	2	—	1	3	1	1	31%	18%	23%	22%
Small	1	—	—	—	4	1	1	—	6%	18%	19%	6%
Moderate	—	—	—	—	1	1	—	—	—	6%	6%	—
Pronounced	1	1	—	—	—	—	—	—	13%	—	6%	—

The Os Calcis.

There are 23 pairs of these bones sufficiently preserved to be measured. Their dimensions, as well as their breadth-height index, differ but slightly in the two localities. The bones also differ very little on the two sides, the right bone being on the average very slightly the larger. The female bones, however, are decidedly smaller than those of the males.

The measurements and indices form an interesting basis for future comparison.

OS CALCIS: AVERAGE DIMENSIONS AND BREADTH-HEIGHT INDEX								
Proportions *	ARKANSAS							
	MALES				FEMALES			
	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left
Length (maximum), cm.	6	<i>8.05</i> (7.4-8.45)	6	<i>8.05</i> (7.3-8.5)	1	6.9	1	6.9
Breadth (minimum at middle of body), cm.	6	<i>2.7</i> (2.5-2.95)	6	<i>2.7</i> (2.55-2.9)	1	2.4	1	2.4
Height (maximum at middle of body), cm.	6	<i>4.0</i> (3.7-4.3)	6	<i>3.9</i> (3.6-4.1)	1	3.55	1	3.4
Breadth-height index <i>($\frac{breadth \times 100}{height}$)</i>	6	<i>67.7</i> (60.5-72.4)	6	<i>69.5</i> (63.4-73.0)	1	67.6	1	70.6

* Pairs only.

OS CALCIS—CONTINUED								
Proportions *	LOUISIANA							
	MALES				FEMALES			
	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left
Length (maximum), cm.	11	$\frac{8.0}{(7.45-8.4)}$	11	$\frac{7.95}{(7.5-8.25)}$	5	$\frac{7.4}{(7.25-7.65)}$	5	$\frac{7.4}{(7.05-7.65)}$
Breadth (minimum at middle of body), cm.	11	$\frac{2.75}{(2.5-2.9)}$	11	$\frac{2.8}{(2.6-3.0)}$	5	$\frac{2.45}{(2.35-2.6)}$	5	$\frac{2.5}{(2.3-2.6)}$
Height (maximum at middle of body), cm.	11	$\frac{4.0}{(3.85-4.2)}$	11	$\frac{3.95}{(3.65-4.2)}$	5	$\frac{3.5}{(3.2-3.7)}$	5	$\frac{3.5}{(3.2-3.7)}$
Breadth-height index $\left(\frac{\text{breadth} \times 100}{\text{height}}\right)$	11	$\frac{68.4}{(61.9-74.0)}$	11	$\frac{70.8}{(67.5-73.4)}$	5	$\frac{69.4}{(64.9-75.0)}$	5	$\frac{70.8}{(68.7-78.1)}$

* Pairs only.

In 72 specimens from both sexes in which the facets for the astragalus can be examined, there are two of these facets in 21 (29 per cent.) and three in 51 cases (71 per cent.). These proportions are almost identical in the skeletons from the two regions: 2 facets in 32 per cent. of the bones from Arkansas, and in 29 per cent. of the bones from Louisiana.

As to sexual differences, two facets exist in 26 per cent. of the males and in 37 per cent. of the females, showing a perceptible preponderance for the latter.

The sustentaculum tali generally shows fair to marked projection. The peroneal spine is frequently well marked. In the more pronounced cases it shows an articular-like surface for the play of the tendon on its under side. The internal tubercle often shows anteriorly, at the insertion of the flexor brevis digitorum, slight to moderate exostoses.

The left os calcis of male skeleton 255.106, Louisiana, presents a rough semi-lunar notch or defect antero-interiorly in the margin of the foremost astragalus facet and the adjoining border.

Astragalus.

The number of clearly-separated articular facets for the os calcis on the astragalus does not by any means correspond with the number of those on the heel bone. Thus, a clear separation by an interval of an anterior and a lateral astragalus facet is present in only four of the 43 specimens, or approximately 10 per cent.

Os trigonum was not found.

The Scaphoid.

Of this bone only a few are present, and among these there is but one that shows any peculiarity. This is from female skeleton 255.096, Louisiana, and the peculiarity consists of a rather pronounced pointed process which rises from the middle of the inferior surface of the bone and anteriorly has an articular facet. The same specimen shows also a small cuboid facet.

The Cuboid.

This bone, of which a fair number of specimens are in hand, shows, as a rule, an elevated or an unelevated facet for the sesamoid in the tendon of the peroneus longus.

The First Metatarsal.

This bone is generally of ordinary form and of moderate dimensions. None of the specimens shows any special features. Their length, given below, indicates close similarity with respect to the two areas from which they came.

FIRST METATARSAL: DIMENSIONS								
	ARKANSAS							
	MALES				FEMALES			
	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left
Average length (maxi- mum), cm.	4*	6.2 (5.8-6.8)	5	6.2 (5.8-6.5)	1	5.65	2	5.65 (5.55-5.75)
	LOUISIANA							
	MALES				FEMALES			
	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left	Num- ber of speci- mens	Right	Num- ber of speci- mens	Left
Average length (maxi- mum), cm.	5	6.0 (5.7-6.2)	4	6.3 (6.0-6.5)	2	6.0 (5.6-6.4)	1	5.7

* Not pairs.

Phalanges. Hand Bones.

Only a few of these bones were recovered, and, beyond some pathological lesions, referred to under Section VI (p. 229), they show nothing of special interest.

VI. PATHOLOGICAL OBSERVATIONS. DETAILS.

ARKANSAS.

*Males.*255.119.¹*Vertebrae* : moderate marginal exostoses on one lumbar.*Phalanges* : the first right terminal phalanx of the foot has moderate excrescences on its plantar surface.255.121.²*Femora* : right—moderate inflammatory changes about linea aspera, middle fourth ;

left—moderate inflammatory changes with augmentation in size at inner lip of linea aspera, below middle, on adjacent bone, and on shaft, posteriorly, below the third fourth of the same from above.

Tibiae : right—moderate inflammatory changes over large part of surface of shaft.*Clavicles* : right—inflammatory changes on distal end.*Vertebrae* : one cervical and two lumbar have marginal exostoses; the former shows also roughened (arthritic) articular surfaces on the processes.*Os calcis* : right ankylosed with astragalus (Fig. 7, c).*Cuneiform* : right middle fused completely with the metatarsal of the second toe (Fig. 7, b).255.121a.³*Tibiae* : left—slight inflammatory changes on shaft.255.123.⁴*Skull* : A gumma (in all probability), hollow in frontal, 3 cm. above nasion and near median line; also a scar, probably of similar origin (*i. e.*, syphilitic), 5.5 cm. above nasion, in median line.*Femora* : right—inflammatory changes posteriorly, above lowest fourth, and trace of such anteriorly, over lowest fifth ;

left—inflammatory changes over lowest third, above condyles.

Tibiae : left—moderate inflammatory changes over shaft.*Sternum* : entire bone shows irregular hyperplasia of anterior surface, and thickening.*Clavicles* : right—shaft shows thickening and inflammatory changes.¹ Healthy : skull, both humeri, both radii, both ulnæ, both femora, both tibiae, both clavicles, sacrum and parts of pelvic bones, left patella, both calcanea.² Healthy : skull, both humeri, both radii, both ulnæ, left tibia, left clavicle, sacrum, both patellæ, left os calcis.³ Healthy : left humerus, right patella.⁴ Healthy : both humeri, left ulna, right tibia, right fibula, left clavicle, pelvis, vertebrae, right patella, left os calcis.

255.124.¹

Skull: The meatus auditorius on each side narrowed by a hyperostotic ridge rising from what was once the posterior free extremity of the tympanic ring (= *tr* exostosis).

Femora: left—inflammatory changes on posterior surface, lowest fourth, also next to external lip of linea aspera at middle.

Tibiæ: right, slight; left, considerable inflammatory changes over shaft.

Fibulæ: left—slight inflammatory changes over shaft.

Clavicles: right—old fracture in middle.

Vertebræ: fourth and fifth lumbar show marginal exostoses.

Os calcis: right—some inflammatory changes over surface.

Phalanges: of body. Several of hands show inflammatory changes.

255.125.²

Femora: right—moderate inflammatory changes posteriorly above internal condyles.

255.126.³255.127.⁴

Skull: A limited area of increased porosity on the postero-superior portion of each parietal, above the lambdoid suture.

255.128.⁵255.131.⁶

Tibiæ: right—inflammatory changes above popliteal ridge.

255.132.⁷255.133a.⁸255.134.⁹255.135.¹⁰255.136.¹¹

Tibiæ: in both traces of inflammatory changes on surface of shaft.

255.138.¹²

Astragalus: left—the whole upper articular surface, top and sides, changed through disease—flattened, rough, and irregular (Fig. 9, g).

¹ Healthy: right humerus, left radius, left ulna, right femur, right fibula, left clavicle, sternum, right innominate, left patella, left os calcis.

² Healthy: skull, left humerus, left radius, left ulna, left femur, right innominate, left os calcis.

³ Healthy: skull, both humeri, both radii, right ulna, both femora, right tibia, both clavicles, pelvis, vertebræ, right os calcis.

⁴ Healthy: both humeri, both femora, left tibia, pelvis, vertebræ.

⁵ Healthy: skull, both femora, both tibiæ, left patella.

⁶ Healthy: both femora, left tibia, both calcanea.

⁷ Healthy: both humeri, both ulnæ, both femora, right tibia, both clavicles, right patella.

⁸ Healthy: both femora.

⁹ Healthy: both humeri, right radius, both femora, both tibiæ, both clavicles, vertebræ, both calcanea.

¹⁰ Healthy: both humeri, left radius, left ulna.

¹¹ Healthy: left femur, left fibula, right os calcis.

¹² Healthy: both humeri, left radius, both ulnæ, both femora, both tibiæ, both clavicles, vertebræ, right patella, right os calcis.

255.138a.

Tibiæ: left—synostosis (without previous fracture or other visible injury of either bone) with fibula by one strong bony septum, 6.5 cm. long, and another small one, slightly lower, 2.5 cm. above lower articular surface.

255.139.¹255.140.²

Tibiæ: right—inflammatory changes above popliteal ridge.

Bones of the foot: on right the first metatarsal, internal and middle cuneiform, and scaphoid, are fused into one mass, apparently since early stage of growth (Fig. 7, d).

255.141.³

Sternum: arthritic condition of articular surfaces of first rib.

Vertebræ: fourth lumbar shows moderate marginal exostoses.

Os calcis: left—region of attachment of ext. brevis digitorum muscle rough and porous.

255.142.⁴255.145.⁵255.149.⁶255.150.⁷255.152.⁸

ARKANSAS.

*Females.*255.120.⁹

Femora: left—smooth bony swelling, 1.2 cm. long by 0.7 cm. broad and 0.3 cm. high, internally, slightly below middle.

Vertebræ: all lumbar show marginal exostoses.

255.122.¹⁰

Scaphoid: suppurative depression on articular surface for internal cuneiform near distal edge.

255.129.¹¹

Vertebræ: cervical—fourth and fifth show marginal exostoses and roughening of lateral articular surfaces;

lumbar—marginal exostoses, and in last three also excrescences about lateral articular surfaces.

¹ Healthy: both femora, both tibiæ.

² Healthy: left tibia, left fibula, left patella, both calcanea.

³ Healthy: skull, both humeri, both radii, both ulnæ, both femora, both tibiæ, both clavicles, both patellæ (right anomalous. See Fig. 9, d), right os calcis.

⁴ Healthy: right patella, both calcanea.

⁵ Healthy: skull.

⁶ Healthy: skull.

⁷ Healthy: skull.

⁸ Healthy: skull.

⁹ Healthy: skull, both humeri, both radii, right femur, both tibiæ, left fibula, pelvis, right patella, both calcanea.

¹⁰ Healthy: skull, both humeri, right femur, left tibia, left fibula, both clavicles, two vertebræ, right patella, both calcanea.

¹¹ Healthy: skull, both humeri, both ulnæ, both femora, both clavicles, pelvis, right os calcis.

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255.130.¹

Vertebræ: fourth lumbar diseased in posterior third of upper surface of body; nature of pathological condition (?) (Fig. 9, e).

255.133.²

Tibiæ: right—slight inflammatory changes on internal surface, above middle.

255.137.³

255.143.⁴

Vertebræ: lumbar show marginal exostoses (moderate).

255.144.

Skull: A shallow depression, 3.0 by 4.5 cm., in the left parietal, near the lambdoid and reaching to the sagittal suture.

255.146.⁵

255.147.⁶

255.148.⁷

255.151.

Skull: All bones, vault and face, thickened, but no irregularities or scars.

LOUISIANA.

Males.

255.099.⁸

255.100.⁹

255.100a.¹⁰

255.102.¹¹

255.102a.¹²

255.104.¹³

Vertebræ: lumbar—slight marginal exostoses; lateral articular facets show arthritic changes.

255.106.¹⁴

Tibiæ: right—effects of suppurative condition anteriorly, on lower end.

255.107.¹⁵

Vertebræ: lumbar—marginal exostoses; lateral articular facets of one show arthritic changes.

¹ Healthy: skull, both humeri, right radius, right ulna, both femora, both tibiæ, pelvis, right patella, right os calcis.

² Healthy: left humerus, left radius, both femora, left tibia.

³ Healthy: both femora, both tibiæ.

⁴ Healthy: skull, both humeri, left radius, both femora, right clavicle.

⁵ Healthy: skull, four vertebræ.

⁶ Healthy: skull, two vertebræ.

⁷ Healthy: skull.

⁸ Healthy: both humeri, right radius, right femur, both clavicles.

⁹ Healthy: both humeri, right tibia, right fibula.

¹⁰ Healthy: left fibula.

¹¹ Healthy: skull, both humeri, left radius, both ulnæ, both femora, both clavicles, two vertebræ.

¹² Healthy: right ulna, right femur, right clavicle.

¹³ Healthy: skull, both humeri, both tibiæ, nine vertebræ.

¹⁴ Healthy: skull, both humeri, left radius, left ulna, both femora, left tibia, left fibula, right clavicle, pelvis, sixteen vertebræ.

¹⁵ Healthy: skull, right humerus, right radius, right ulna, six vertebræ.

255.109.¹*Vertebræ* : lumbar—slight upper marginal exostoses.255.110.²255.111.³*Tibiæ* : left—inflammatory changes about the middle fourth of internal border.*Vertebræ* : fifth, sixth, and seventh cervical, twelfth dorsal, show arthritic changes, and all lumbar vertebræ have marginal exostoses.255.114.⁴

255.115.

Skull : *tr* exostoses in both meatus auditorii, nearly occluding the right.255.154.⁵255.201.⁶*Femora* : right—a small exostosis from anterior surface of great trochanter ; left—moderate marginal exostoses about lower articular surface.*Vertebræ* : lumbar—marginal exostoses.*Os calcis* : right—an exostosis, or a fusion of a separate small bone, in front of the insertion of the external brevis digitorum.*Patellæ* : left—marginal exostoses and an arthritic spot (Fig. 9, h).255.203.⁷255.204.⁸255.205.⁹*Tibiæ* : .205 (3), left—moderate swelling about internal border at middle and lower third ;

.205 (4) left—slight inflammatory changes on upper fourth of shaft ;

.205 (5) left—inflammatory changes over most of shaft ;

.205 (6) right—moderate inflammatory changes on internal surface, below middle.

255.209.¹⁰*Vertebræ* : last dorsal and all lumbar show marginal exostoses.*Os calcis* : left—moderate lesion just posterior to anterior astragalus facet (nature?).¹ Healthy : left humerus, left radius, both ulnæ, both femora, both tibiæ, both fibulæ, eight vertebræ, both patellæ.² Healthy : right radius, right ulna, both femora, both tibiæ, both fibulæ, pelvis, six vertebræ, both patellæ.³ Healthy : skull, both humeri, right tibiæ, both clavicles, pelvis, fourteen vertebræ, both patellæ.⁴ Healthy : skull.⁵ Healthy : skull.⁶ Healthy : skull, both humeri, both radii, both ulnæ, both tibiæ, both fibulæ, pelvis, nineteen vertebræ, left os calcis, right patella.⁷ Healthy : skull, three cervical vertebræ.⁸ Healthy : skull, four cervical vertebræ.⁹ Healthy : eight humeri, five radii, four ulnæ, twelve femora, seven tibiæ, two fibulæ, two clavicles, one pelvis.¹⁰ Healthy : skull, both humeri, right radius, right ulna, both femora, both tibiæ, both fibulæ, both clavicles, pelvis, eighteen vertebræ, right os calcis.

255.210.¹*Vertebræ* : lumbar—marginal exostoses.255.211.²*Vertebræ* : cervical—fifth, sixth, and seventh show arthritic changes;
lumbar—marginal exostoses and arthritic changes.255.215.³*Vertebræ* : cervical—third, fourth, and fifth with arthritic changes;
lumbar—fifth with arthritic changes.*Patellæ* : left—arthritic changes on articular surface.255.217.⁴*Femora* : in both slight inflammatory changes externally above outer condyle.*Vertebræ* : cervical—all below atlas show arthritic changes (roughening,
increased porosity, and irregular enlargement of most lateral and
also body articular surfaces);

dorsal—arthritic changes on first and second;

lumbar—marginal exostoses.

Patellæ : right—articular surface shows arthritic changes.255.218.⁵*Tibiæ* : on both slight inflammatory changes over shaft.*Vertebræ* : lumbar—one (the only one present) shows marginal exostoses.255.221.⁶255.222.⁷*Vertebræ* : cervical—arthritic changes on body and articular surfaces, fourth
to seventh;

dorsal—marginal exostoses on two lowest.

255.223.⁸*Tibiæ* : left—a sharp exostosis of moderate size below external tuberosity,
at about the insertion of flexor communis.255.224.⁹¹ Healthy : skull, both humeri, both radii, both ulnæ, both femora, both tibiæ, both fibulæ, right clavicle, pelvis, twelve vertebræ, left patella.² Healthy : skull, both humeri, both radii, both ulnæ, both femora, both tibiæ, both fibulæ, both clavicles, eleven vertebræ, left patella.³ Healthy : skull, both humeri, both radii, both ulnæ, left femur, left tibia, both fibulæ, right clavicle, pelvis, seventeen vertebræ (seventh cervical anomalous; see Fig. 9, a).⁴ Healthy : skull, both humeri, left radius, both ulnæ, right tibia, right fibula, sacrum (anomalous articulation with fifth lumbar; see Fig. 8), ten vertebræ.⁵ Healthy : skull, both humeri, both radii, both ulnæ, both femora, both clavicles, fifteen vertebræ, left patella.⁶ Healthy : both humeri, left radius, both ulnæ, both femora, both tibiæ, both fibulæ, both clavicles, sacrum, twenty-one vertebræ, right patella.⁷ Healthy : both humeri, both radii, both ulnæ, both femora, both tibiæ, both clavicles, one cervical and four dorsal vertebræ.⁸ Healthy : both ulnæ, both femora, right tibia, both patellæ.⁹ Healthy : both humeri, both radii, both ulnæ, both femora, both tibiæ, right clavicle, pelvis.

LOUISIANA.

*Females.*255.094.¹

Skull: Surface of frontal bone irregular over middle, approaching low-nodular.

Humeri: both show advanced inflammatory changes; surface irregular.

Radii: both present inflammatory changes.

Ulnæ: right—probably an old fracture above lowest third;
left—inflammatory changes over shaft.

Clavicles: both show inflammatory changes on shaft.

Vertebræ: cervical—atlas, axis, and fourth show arthritic changes, with some marginal exostoses;
lumbar (two present)—marginal exostoses.

255.095.²

Vertebræ: lumbar—third, fourth and fifth with marginal exostoses.

255.096.³

Ulnæ: right—fracture above lowest third, non-union, irregular articulation.

Tibiæ: right—some inflammatory changes over surface of middle third.

Vertebræ: dorsal—slight marginal exostoses on twelfth;
lumbar—marginal exostoses on all.

Astragalus: right shows results of healed suppurative condition about head (Fig. 9, f).

255.097.⁴

Radii: right—fracture at middle.

Ulnæ: right—fracture below middle third.

Vertebræ: marginal exostoses on eleventh dorsal, and second, third and fourth lumbar.

255.098.⁵

Radii: right—fracture above lowest fourth.

255.103.⁶

Vertebræ: marginal exostoses on lumbar, and bodies of all these moderately and irregularly flattened.

Scaphoid: right shows slightly incomplete old fusion with internal cuneiform.

¹ Healthy: four vertebræ.

² Healthy: skull, left humerus, both radii, both ulnæ, right fibula, right clavicle, seventeen vertebræ.

³ Healthy: both humeri, right radius, both femora, left tibia, both clavicles, pelvis, five vertebræ.

⁴ Healthy: both humeri, left ulna, both femora, both tibiæ, both fibulæ, one dorsal vertebra and one lumbar vertebra, left patella.

⁵ Healthy: both humeri, both femora, right fibula, left patella.

⁶ Healthy: skull, both humeri, right radius, both femora, both tibiæ, both fibulæ, both clavicles, sacrum, nine vertebræ.

255.105.¹

Tibiæ : in both, pathological curvature backward at middle, and inflammatory changes over middle third.

Fibulæ : left—inflammatory changes over shaft.

Vertebræ : several lower dorsal and one (the only one present) lumbar show marginal exostoses.

255.108.²

Humeri : left—moderate exostosis a short distance posteriorly to lower third of deltoid ridge.

255.112.³

Clavicles : left—arthritic changes, sternal end.

Vertebræ : cervical—slight roughening of articular surfaces of bodies of third to seventh ;

dorsal—marginal exostoses on several lower ones ;

lumbar—slight to moderate upper marginal exostoses on all.

255.113.⁴

Skull : A large patch of irregular, scarry, hardened surface on postero-superior part of right parietal.

255.116.⁵255.117.⁶255.118.⁷255.202.⁸

Skull : A small superficial scar in middle of forehead.

255.205.⁹

Radii : A pair, .205 III, show inflammatory changes over shaft.

Ulnæ : A pair, probably from same skeleton as above radii, show inflammatory changes over shaft.

Femora : A pair, probably from same skeleton as above ulnæ and radii, with inflammatory changes over surface of lowest third of shaft.

Tibiæ : A pair, showing, especially the right, an abnormal curvature backward and somewhat inward at middle, and inflammatory changes over most of the surface. Belongs probably to the same skeleton as the above.

Fibulæ : right—shaft shows inflammatory changes ; probably of the same skeleton as the above.

¹ Healthy : skull, both radii, right ulna, both femora, pelvis, eight vertebræ.

² Healthy : right humerus, both radii, left femur.

³ Healthy : skull, right humerus, both radii, both ulnæ, both femora, six vertebræ.

⁴ Healthy ; three cervical vertebræ.

⁵ Healthy : skull.

⁶ Healthy : skull, two cervical vertebræ.

⁷ Healthy : skull.

⁸ Healthy : six cervical vertebræ.

⁹ Healthy : seven humeri, four radii, one ulna, five femora, four clavicles.

255.207.¹

Femora : left—an exostosis, 1.2 cm. long and 0.7 cm. high, scale-like, pointing mediad, just below minor trochanter.

255.208.²255.212.³

Vertebrae : cervical—the lower articular surface of body of fifth and the upper of that of sixth show arthritic changes;
lumbar—marginal exostoses on fifth.

255.213.⁴

Femora : left—a hardened oblong swelling, of moderate size, on external border above middle.

Sacrum : moderate marginal exostoses along free border of body of the first segment.

Vertebrae : cervical—left corresponding lateral articular facets of axis and third, and articular surfaces of body of fourth, show arthritic changes;

lumbar—marginal exostoses.

255.214.⁵

Vertebrae : lumbar—slight marginal exostoses on third, fourth, and fifth.

255.216.⁶

Femora : both show moderate diffuse inflammatory changes over surface of shaft.

Tibiae : right—slight inflammatory changes over shaft;

left—slight inflammatory changes about popliteal ridge and over shaft.

Vertebrae : lumbar—marginal exostoses on fourth and fifth.

255.219.⁷

Tibiae : in both, but especially in right, some inflammatory changes over shaft.

Vertebrae : lumbar—marginal exostoses on third, fourth, and fifth.

Patellae : left—arthritic changes on articular surface.

255.220.⁸

Vertebrae : lumbar—one (two present) shows marginal exostoses.

¹ Healthy : skull, both humeri, both radii, both ulnæ, right femur, both tibiæ, both clavicles, four cervical vertebrae, right patella.

² Healthy : skull.

³ Healthy : skull, both humeri, right radius, both ulnæ, both femora, both tibiæ, both fibulae, both clavicles, sacrum, nineteen vertebrae (first dorsal anomalous; see Fig. 9, b), right patella.

⁴ Healthy : skull, both humeri, both radii, both ulnæ, right femur, both tibiæ, left fibula, left clavicle, left os innominatum, twelve vertebrae, both patellæ.

⁵ Healthy : skull, left humerus, left radius, both ulnæ, both femora, left clavicle, pelvis, twelve vertebrae, both patellæ.

⁶ Healthy : skull, both humeri, both radii, both ulnæ, both clavicles, pelvis, nine vertebrae.

⁷ Healthy : skull, both humeri, both radii, both ulnæ, both femora, right fibula, both clavicles, eleven vertebrae.

⁸ Healthy : skull, right humerus, both radii, both ulnæ, both femora, both tibiæ, left fibula, both clavicles, nine vertebrae, both patellæ.

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255.225.¹

Vertebræ : dorsal—slight marginal exostoses on several lower ones;
lumbar—slight upper marginal exostoses on all.

255.226.²

Vertebræ : lumbar—marginal exostoses.

255.227.³

Ulnæ : left—inflammatory changes over shaft.
Tibiæ : right—considerable inflammatory changes over shaft.

BONES EXHIBITING PATHOLOGICAL CONDITIONS: RÉSUMÉ*									
	Total number of specimens, from both States	Healthy	Inflammatory changes in	Marginal exostoses in	Arthritic changes on articular surfaces in	Fractures in	Exostoses other than marginal in	Abnormal curvatures in	Various in
Skulls †	58	49	6			—	2		1
Humeri	115	113	2	—	—	—	—	—	—
Radii	90	84	4	—	—	2	—	—	—
Ulnæ	86	80	3	—	—	3	—	—	—
Femora	122	105	15	1	—	—	1	—	—
Tibiæ	97	67	28	—	—	—	1	2	1
Fibulæ	47	44	3	—	—	—	—	—	—
Clavicles	70	64	4	—	1	1	—	—	—
Sterna	11 bodies and 7 manubria	10 bodies and 5 manubria	1 body		2 manu- bria	—	—	—	—
Scapulæ	3	3							
Pelves	15	15							
Ossa innominata	3	3							
Sacra	9	8	—	1	—	—	—		—
Vertebræ : cervical	182, from 46 individuals	144	—	38, from 12 indi- viduals (mainly arthritic chan- ges)	—	—	—		—
“ dorsal	380, from 48 individuals	362	—	18, from 9 indi- viduals (mainly marginal exos- toses)	—	—	—		Body asymmetric in numerous specimens
“ lumbar	194, from 45 individuals	87	—	106, from 33 indi- viduals (almost wholly margi- nal exostoses)	—	—	—		1
Patellæ	49	45	—	1	3	—	—		—
Calcanea	70	65	—	—	1	—	—		4
Other tarsal bones	97	90	—	—	3	—	—		4
Metatarsals and Phalanges	9	5	3 (1 individual)	—	—	—	—		3

* With these should be borne in mind the specimens now in the United States Army Medical Museum, so far as the latter pertain to the skeletons under consideration. They are: two femora of a female subject, No. 255.225, from Ward Place, Louisiana, showing bilateral upper congenital dislocation; right femur and tibia, from subject 255.215, same locality, with signs of osteoarthritis; two stray right tibiæ from Boytt's Field, Arkansas, and Bray's Landing, Louisiana, with inflammatory changes on shaft; and the fractured radius and ulna from the left forearm of subject No. 255.100, Bell Ginn Landing, Arkansas.

† Exclusive of pathological conditions due to the teeth.

¹ Healthy: both humeri, left ulna, both fibulæ, seven vertebræ, right patella.

² Healthy: both humeri, both radii, both ulnæ, both femora, left tibia, pelvis, nineteen vertebræ, left patella.

³ Healthy: right humerus, right radius, right ulna, both femora, seven vertebræ, both patellæ.

NOTES.

"Inflammatory Changes."—Under this heading are included pathological changes which first affect limited areas of the surface of the shaft, or body of the bone, and in more advanced cases cover most or all of the surface of the shaft, or body of the bone and involve more or less its walls. In the earlier stages the changes are apparently due to slow inflammatory conditions originating in the periosteum and accompanied by more or less perceptible osteophytic deposits. Later, as the inflammatory process progresses, the surface of the shaft becomes more or less irregular and nodular, and the pathological alteration extends to the interstitial parts of the bone, causing considerable thickening, with increase in weight of the shaft of the bone. It affects most often the tibiæ; the vertebræ and pelvic bones appear to be immune. In all probability this process indicates syphilis; but there are instances in which it is impossible to decide whether the changes should be ascribed to this disease or to that systemic condition which results in arthritic changes in various articulations. In the majority of the cases in which such inflammatory changes have occurred in one or more bones of an individual, the skull has been found normal.

"Marginal Exostoses."—These are characteristic excrescences of a definite though as yet somewhat obscure significance, occurring with great frequency, indeed quite generally, in older subjects, both among whites and among the Indians. These excrescences may form about the articular surface of long bones, but are most common about the surfaces of the bodies of the lumbar vertebræ. They begin along the upper margin of the last three lumbar, then appear along the upper margins of the two superior vertebræ of that region and possibly along those of one or two of the last dorsals, and then develop along the lower borders of the same bones. They frequently involve the free border of the uppermost segment of the sacrum, and occasionally accompany arthritic changes in cervical or other lateral articulations. On the whole they bear close etiological relation with the systemic condition that results in osteoarthritis. In advanced stages these marginal exostoses are always accompanied with roughening and other inflammatory changes of the articular surface about which they occur, and in the end the result is a fusion of the adjacent vertebræ. In extreme cases whole regions of the spine, and even the entire spine, as well as the pelvic bones, become consolidated through this change. The beginnings of the condition may be observed in middle-aged adults, but it is especially a feature accompanying old age. It may coexist with other slow inflammatory conditions of the bones, in which case a diagnostic separation of the processes may be very difficult.

"Arthritic Changes on Articular Surfaces."—These changes begin generally in augmented porosity of the articular surface, followed by increased roughness and irregularity of the same. They are most commonly observed on the lateral articular surfaces of the cervical vertebræ, but are occasionally seen on those of the upper dorsal or some of the lumbar vertebræ, on the sacro-iliac surfaces, and even on the articular facets of the long and other bones. As above mentioned, these changes

occur also on the superior and inferior surfaces of the bodies of the vertebræ. They generally involve both of the articular surfaces in apposition, and in the vertebral column lead ultimately to anchyloses. They are frequently accompanied by marginal exostoses along the border of the affected articulations. The two processes, in fact, are closely related and probably are due to the same general causes.

"Fractures."—The fractures observed in this collection are comparatively few, fewer than would be found in a similar number of bones of modern whites. It is further noteworthy that all but one of the fractures are in the bones of the forearm, the exception being one in a clavicle. There is no fracture of the bones of the lower extremities. The healing, barring the case in which union did not take place (Fig. 7, a), is of good character in all the specimens, though attended with more or less marked effects of original displacement of the fragments (see Fig. 6).

"Exostoses other than Marginal."—The majority of exostoses pertaining to this class are formed at the insertion of muscles, or on ridges, such as the popliteal, or within the intermuscular septa. Some of them doubtless stand in causal relation with the marginal exostoses and arthritic changes. Others, particularly those in the intermuscular septa, are manifestations *sui generis*, the cause of which, particularly in young subjects, is not clearly understood. In the series of bones under consideration, the exostoses other than marginal are few, and, with one exception, unimportant. The exception applies to the bony septum found to connect, without sign of injury or disease, the left tibia and the fibula of male skeleton No. 255.138 a from Arkansas (Fig. 5).

"Abnormal Curvatures."—Curvatures slightly to moderately above the average, but without reaching a degree which can be considered pathological, are common in the femora of this collection, and also in some of the bones of the forearm. In the femora such curvatures are generally noticeable at or about the middle of the shaft, the upper part of the bone being bent backward, and are usually compensated for by an especially high posterior femoral ridge (*linea aspera*). Specimens of the so-called "pilasteric femur" generally indicate cases of this nature. In two instances only do curvatures occur which can be regarded as pathological. They are both in the tibia, and may be due to a mild degree of rachitis, although there are no signs of this disease on the remaining parts of the skeletons.

"Various."—The only subject requiring particular mention under this heading is the frequently observed asymmetry of the bodies of the dorsal vertebræ. This unevenness relates only to the contour of the bodies, not to their vertical dimensions. In no case is the particular cause discernible.



FIG. 1.—Non-deformed crania from Arkansas: *a*, *b*, and *c* = No. 255.119; *d* = No. 255.149.

FIG. 2.—On left, two views of non-deformed male skull, 255.126, Arkansas. On right, female skull, 255.094, Louisiana, showing senile parietal depressions above the temporal ridges.





a



b



c



d

FIG. 3.—a, b, and c = non-deformed female skull, 255.095, Louisiana; d = male skull, 255.210, Louisiana, showing moderate fronto-occipital compression.



FIG. 4.—*x* = male skull, 255.115, Louisiana, showing intraauricular exostosis, and also a well-marked supraauricular fossa (another seen on Fig. 3, *d*); *y* = male skull, 255.106, Louisiana, showing lateral fissures in the basilar process.



FIG. 5.—255.108, Louisiana, left female humerus, showing a peculiar exostosis at *e*; 255.138*a*, Arkansas, left male tibia and fibula, showing a synostosis by means of two exostoses.



FIG. 6.—Bones showing healed fractures.



FIG. 7.—*a*.—Right ulna, from female skeleton 255.096, Louisiana, showing lack of union after fracture; the two segments form an irregular articulation.
b.—From male skeleton 255.121, Arkansas, showing old fusion of the metatarsal of the right second toe and middle cuneiform.
c.—Specimen from same skeleton as *b*; shows old, slightly incomplete fusion of os calcis and astragalus.
d.—From male skeleton 255.140, Arkansas, showing old fusion of right first metatarsal with internal and middle cuneiform and scaphoid.

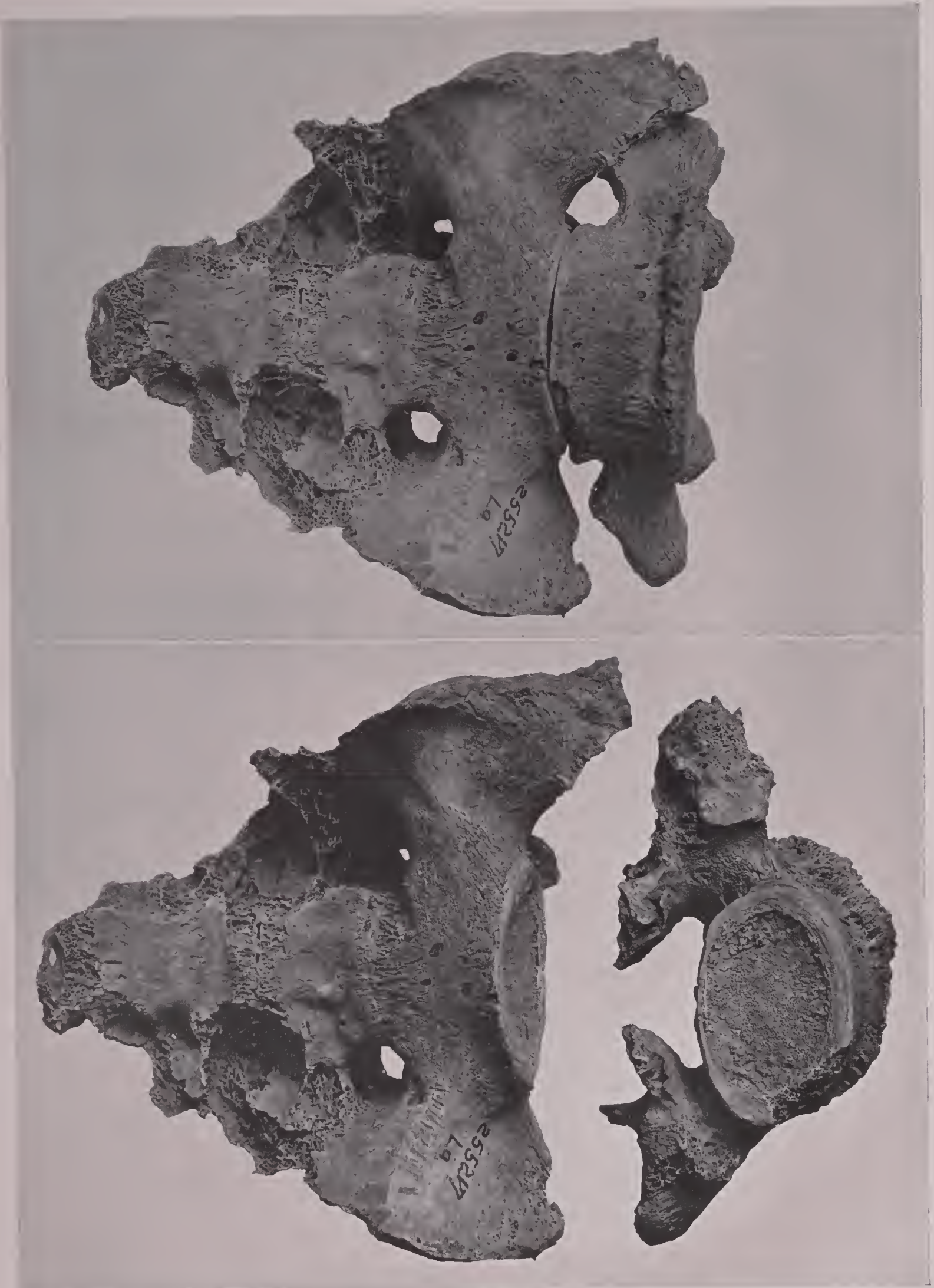


FIG. 8.—Sacrum and fifth lumbar vertebra from male skeleton 255.217, Louisiana, showing, on right, overgrowth of the lateral mass of the sacrum and its irregular, as well as partly arthritic, articulation with the also enlarged lateral process of the last lumbar vertebra ("partial assimilation of the last lumbar").



FIG. 9.—*a*.—Seventh cervical of male skeleton 255.215, Louisiana, showing a defect of fusion of the two parts that compose the spinous process.
b.—Peculiar anomaly of the first dorsal of female skeleton 255.212, Louisiana; there are two well-developed articular facets for ribs.
c.—Fourth lumbar of female skeleton 255.219, Louisiana, with a separation of the posterior part of the neural arch; the articular surfaces between the pedicles and laminae are very rough and irregular.
d.—Right patella of male skeleton 255.141, Arkansas, showing a large vastus externus notch.
e.—Fourth lumbar of female skeleton 255.130, Arkansas, showing diseased condition of upper articular surface of the body.
f.—Right astragalus of female skeleton 255.096, Louisiana, showing results of a healed suppurative condition about the head.
g.—Left astragalus of male skeleton 255.138, Arkansas, showing results of disease.
h.—Left patella of male skeleton 255.201, Louisiana, showing marginal exostoses and arthritic spot on the articular surface.
i.—Right scaphoid and internal cuneiform of female skeleton 255.103, Louisiana, showing an old, nearly complete, fusion.

REPORT

ON AN

Additional Collection of Skeletal Remains,
from Arkansas and Louisiana

(Made, and presented to the National Museum, in 1909, by Mr. Clarence B. Moore)

BY

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